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EDITED BY

HENRY TRIMEN, M.B., F.L.S.,

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THE
JOURNAL OF BOTANY,
BRITISH AND FOREIGN.

Original Articles.

RUMEX RUPESTRIS, *Le Gall*, AS A BRITISH PLANT.

By Henry Trimen, M.B., F.L.S.

(Tab. 173.)

That the species of Dock in this country will still reward examination is evidenced by the satisfactory determination of *R. rupestris* as a native of the West of England, some account of which will be found in the last year's volume (1875, pp. 294, 337). It is true that this species has been before us since 1862, when Prof. Babington mentioned it with some reserve in the fifth edition of his *Manual*, as found in Jersey; but the Channel Islands cannot be considered part of our country botanically, and this Dock does not seem to have been recorded as since met with there. The species has thus remained misunderstood or unknown by British botanists till Mr. Archer Briggs' fine suite of specimens and careful notes have now cleared up the matter.

The first indication in books of this Dock is in Lloyd's "Flore de la Loire Inférieure" (1844), where under *R. conglomeratus* (p. 222) is the note "plus robuste, feuil. épaisses, fruits plus gros dans les sables et sur les rochers maritimes," but no varietal name is there given to it. The plant had, however, been recognised as worth attention before this time, for in 1834 M. J. Gay grew it at Paris from wild Normandy seed, specimens then raised by him being labelled "*R. conglomeratus*, var. *orthoclada*." The date of the observation of the plant in Jersey by Mr. Newbould and Prof. Babington was 1842. According to Meisner, Le Gall named it *R. rupestris* in 1849, but the first description of that species which I have seen is in Le Gall's "Flore de Morbihan" (p. 501), the date of which is 1852. In this accurate book the characters are shortly and clearly given, and the plant is stated to grow in the clefts of maritime rocks in Belle-île, where it was refound by Col. Debooz in 1847, and at Quiberon, Saint Gildas, and Arradon on the neighbouring coast. Since the date of Le Gall's Flora, *R. rupestris* had been recorded from other localities on the coast of Brittany and of Vendée, and also on the western shores of Normandy, at Cap de Carteret, several places near Cherbourg (where the late M. Thuret first gathered it in 1853), &c. Quite recently it has been met with in the Ile d'Ouessant, the most western portion of France, in the latitude of Falmouth. I have not found a record of its occurrence on any other part of the French coast. Nyman in the supplement to his Sylloge gives it as Spanish (Galicia), but it is not mentioned in the more recently published "Prodromus Fl. Hispanicæ" of Willkomm and Lange. It is not known from elsewhere in Europe.

From this distribution—W. Normandy and Brittany and their outlying islets, Vendée, and perhaps Galicia—one was quite prepared to find the plant on our own western coast, and as it has now been observed in the Scilly Isles by Mr. Beeby, near Helston by Mr. Cunnack, and near Plymouth by Mr. Briggs,* there is every reason to expect it as a pretty frequent plant on the coasts of Devon and Cornwall. The localities in which the plant occurs on our western shores are precisely the same as in France. Mr. Briggs writes:—"It seems to be a truly maritime species, being absolutely confined to the coast line, where it grows on low damp rocks and in sandy or stony spots, but rarely extending for a yard or two up the side of a cliff." All the French writers agree in regarding it as a plant strictly of maritime tendency, and, as indicated by its name, specially growing at the foot of rocks.

The following description is made entirely from Mr. Briggs' series of English specimens:—

RUMEX RUPESTRIS, *Le Gall*, in Congrès Scient. de France, 1849, 1, p. 143 (ex Meisner); Flore de Morbihan, p. 501 (1852); Lloyd, Fl. de l'Ouest de la France, p. 388 (1854); Nyman, Suppl. Syll. Europ., p. 56; Gren. & Godr., Fl. de France, iii., p. 37; Boreau, Fl. du Centre, ed. 3, ii., p. 552; Brèbisson, Fl. de la Normandie, ed. 3, p. 260.

R. conglomeratus, var. *orthoclada*, J. Gay in sched.

R. sanguineus, L., var. *β. viridis*, Sm., Meisner in DC. Prod., xiv. (1856), p. 49.

Stem about 2 feet high, stiff; *branches* confined to the upper half of the stem, rather numerous, straight, erect, all falling short of the central main stem, and with it forming a slender, rather compact, acute or slightly attenuated panicle. *Root-leaves* on stalks 3 or 4 inches long, narrowly oblong or oblong-lanceolate, about 7 inches long by 1½ wide at the broadest part (the middle), with no tendency to be ovate or panduriform, but tapering slightly and nearly equally at each end, apex blunt or subacute, base slightly tapering or rounded, often unsymmetrical; *stem-leaves* linear-lanceolate or even nearly linear, slightly rounded (not at all cordate) at the base, bluntish at apex; all rather thick, with the margins somewhat undulated. *Whorls* numerous, distinct but rather close, moderately full, the lower two or three of each branch with a leaf, the remainder leafless. *Flowers* drooping, on long pedicels which are jointed below the middle, but not close to the base; petals very blunt. *Fruit*† :—*Ripe petals* narrowly ovate-oblong or oblong, scarcely tapering, fully ⅙ inch long, the larger ones more, very blunt at the apex, entire, closely enveloping the nut, and each bearing a fully developed tubercle, which is very large and prominent, covering nearly the whole width of the petal, oblong-ovoid, at least $\frac{1}{8}$ inch long by $\frac{1}{16}$ broad, opaque almost pearly white when growing, sometimes suffused with purplish-red on exposure (golden-orange and finely shagreened on the surface when dry). *Nut* bright pale brown, shining, faces broadly oval or ovate, pointed, about $\frac{1}{16}$ inch wide.

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* The most easterly spot in which it has as yet been noticed by Mr. Briggs is close by Bigbury Bay, about 9 miles to the east of Plymouth.

† It is convenient to include under the term "fruit" both the enclosed nut (true fruit) and the enlarged persistent petals which share its development after fertilisation.

Whether these characters are sufficient to constitute *R. rupestris* a distinct species is of course a matter of opinion. They approximate it closely to *R. conglomeratus*, of which it may be a variety, but from which it can be distinguished without difficulty by its compact, upright habit with a tapering panicle confined to the upper part of the stem, its narrower and more oblong root-leaves, its few and narrow whorl-leaves, and its very much larger and blunter fruit-petals and larger nut.

It is the constant combination of these distinctions that must be looked at. Singly the most important seem to be the large size and form of the ripe-petals, tubercles, and fruit, and the characteristic habit; the latter has been very fairly likened by Grenier and Godron to that of the N. American *R. salicifolius*, Weinm. At the same time it must be allowed that *R. conglomeratus* is a plant of a wide variability, and is frequently met with under forms which depart from the characters given in books. The type of this species may be considered to be a straggling plant with divaricate branches, broad-based stem-leaves which accompany every whorl except the very terminal ones, and small fruit; but there occur states which modify all these points. A plant with ascending branches, narrower stem-leaves, and most of the whorls leafless is not unfrequently named *R. viridis* or *R. nemorosus*, and is in my opinion the plant gathered in Sussex and considered "trigranulate *nemorosus*" by Dr. Boswell in the last "Exchange Club Report," and perhaps also that figured in "English Botany," on which see a note in the last volume (1875, p. 337). *R. nemorosus* (*R. sanguineus*, *β. viridis*; *R. Nemolapathum*) seems to me quite removed from *R. rupestris*, and very little prone to variation; it can be usually recognised by its tall, slender, lax habit, few but large and somewhat flaccid stem-leaves, quite leafless whorls (except the basal one or two), and single tubercle, which is globular. Stress has been laid by some botanists on the position of the joint in the pedicel as a distinctive mark between *R. conglomeratus* and *R. nemorosus*; this character is difficult to lay hold of, being quite comparative. I think, however, that the joint will be found to be, as generally stated, nearer the base in the latter than in the former; sometimes it is certainly quite close to the stem in *nemorosus*, so that when the fruit falls, carrying the distal portion of the pedicel with it, the remaining stump is a mere tubercle, instead of, as in *conglomeratus* usually, a distinct stalk. The colour of the unopened anthers in the young flowers is also said to afford a good distinctive character, being pale cream-coloured in *conglomeratus* and pale (bright) sulphur yellow in *nemorosus*.

It may be convenient to give references to the published figures of these two species, in continuation of notices of other British species which have been from time to time printed in this Journal.

R. CONGLOMERATUS, *Murr.*

Figures.—Petiver, Herb. Brit. Catal. (1713), t. ii., fig. 3, 4; Eng. Bot., t. 724 ("*R. acutus*"), reprod. (with an alteration) in Syme E. Bot., viii., t. mccx.; Leighton, Fl. Shropshire, p. 153 (petals and fruit); Fl. Danica, xiii., t. 2228; Sturm, Deutschl. Fl., bd. 17, heft 73, t. 4; Reichenb., Iconogr. Bot., iv., t. 368 ("*R. glomeratus*"); Reichenb., l.c., t. 367 ("*R. Nemolapathum*"); E. Bot., t. 1533 ("*R. sanguineus*") reprod. (with details of *R. nemorosus*) in Syme E. Bot., viii., t. mccxi.

Exsicc.—Fries, Herb. Norm., ix., n. 57; Reichenb., Exsicc., n. 1378 ("*R. Nemolapathum*"); Billot, n. 3766; Bourgeau, Pl. Canar., n. 963 & 964.

R. NEMOROSUS, *Schrad.* (*R. sanguineus*, L., & *R. viridis*, Sibth.).

Figures.—Petiver, l.c., fig. 5, 6; Curtis, Fl. Lond., fasc. 3* ("*R. acutus*") (except details, which are *R. conglomeratus*); Fl. Danica, l.c., t. 2229; Leighton, l.c., p. 153 (petals and fruit); Sturm, l.c., tt. 5 & 6; Nees, Pl. Medic., t. 108 & (root) t. 109.

Exsicc.—Fries, Herb. Norm., i., n. 53; Billot, n. 3767.

DESCRIPTION OF TAB. 173.

Rumex rupestris, Le Gall, from a small specimen collected by Mr. Archer Briggs at Bigbury Bay, S. Devon. 1. Upper part of stem, in fruit 2. A root-leaf. 3. Ripe "fruit." 4. A petal with the tubercle removed. 5. Nut. (The details, as well as those of *R. conglomeratus* and *R. nemorosus* added at the upper part of the plate, all × 4 diam.)

GUSTAVE THURET.

THE loss of Gustave Thuret will be deeply felt by all botanists. For more than thirty years he had been known to the scientific world as a most accurate observer, whose writings combined a scientific precision and clearness with a rare beauty of style. As a friend he was always genial and hospitable, ever ready to aid those interested in his favourite pursuit, while, on the other hand, to those who differed from his views he was always liberal and just. Few botanists have been so uniformly fortunate as he. He was fortunate in his wealth, which enabled him to devote his whole time to scientific study; fortunate in his amiability, which prevented personal enmities; fortunate in his friends, who aided him while living; and especially fortunate in leaving a successor capable of carrying on the work to which he had devoted so many years.

Thuret sprang from a French family who, in consequence of their adhesion to the Protestant faith, had been obliged to take refuge in Holland after the revocation of the Edict of Nantes. His father, who had been appointed Consul-General of Holland in France, took up his residence in Paris, where Gustave Adolphe was born, May 23rd, 1817. His early education was conducted at home, and later he attended the lectures of the Ecole de Droit, and in his twenty-first year received

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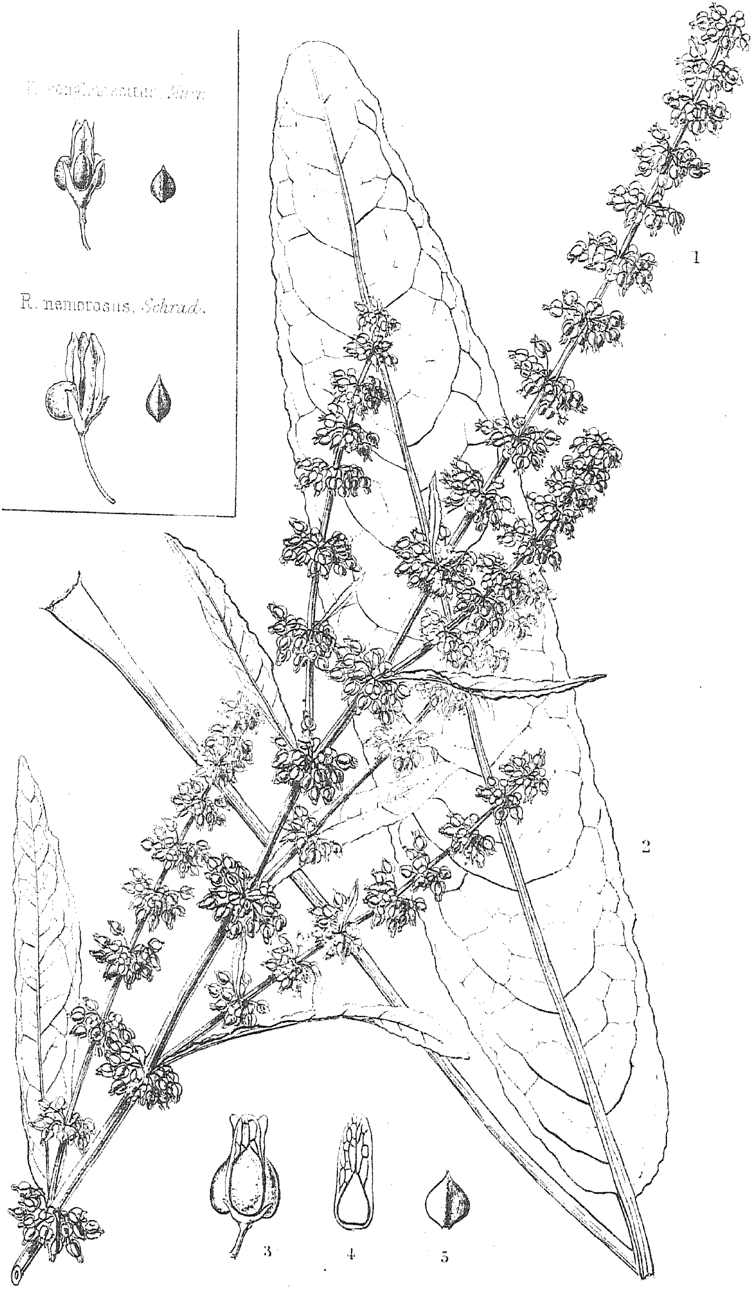
* Sir J. E. Smith (E. Flora., ii., 191, 192) strangely enough refers this characteristic figure to his *R. acutus* (=*R. conglomeratus*).

Tab. 173



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Maclure & Macdonald, Lith. London.

Rumex rupestris. *Le Gall.*

the degree of Licencié. In the meanwhile he made occasional journeys on the Continent and in England, but he never made any long stay in the latter country, although he had studied the language so as to be able to speak it with fluency. After obtaining his degree Thuret passed much of his time at his father's residence, Château Reutilly, near Lagny. It soon became evident that, although he had studied law as a profession, he had no real fondness for it, but, instead, showed a decided preference for music. His passion for music was the means of his forming an acquaintance with M. A. de Villers, who, besides being a musician, was something of a botanist, and had accompanied Adrien de Jussieu on his excursions. From him Thuret took his first lesson in determining plants, and, as doubtful species were referred by M. Villers to Decaisne, Thuret himself was led to seek out the Parisian botanist. Accordingly, in the winter of 1839, he went to Paris and received instruction in botany from Decaisne, and the friendship then began lasted unbroken until the time of his death.

At that time Decaisne was occupied with his "Essais sur une classification des Algues et des Polypiers Calcifères," and he naturally led Thuret to the study of Algæ. The question then attracting the attention of botanists was the motile states of the lower plants, or, as it was often stated, the change of plants into animals, and for the study of this subject Algæ were admirably adapted. The preference of Thuret for plants in motion, for living plants rather than dead and pressed specimens, was early manifested, and in 1840 his first published work, "Note sur l'anthère du Chara, et les animalcules qu'elle renferme," appeared in the "Annales des Sciences." In the same year he went to Constantinople as an attaché of the French Embassy, and, still retaining his fondness for plants, made extensive collections of Phanerogams in the neighbourhood of that city.

In 1844 Decaisne and Thuret were occupied in the preparation of a paper entitled "Recherches sur les anthéridies et les spores." According to Thuret, Decaisne was the first who taught that marine Algæ should be studied in sea-water, for, although it now seems self-evident, before that time botanists had examined marine Algæ after they had been standing in fresh water, and what were recorded as phenomena of plant-life were often nothing but the destructive effects of the fresh water. In order to secure new material for the preparation of their work, Thuret and Descaisne went to the sea-shore at Arromanches. From this time Thuret devoted himself almost exclusively to the study of Algæ. The Academy had in 1847 offered a prize for the best essay on zoospores and antherozoids, and he spent the greater part of his time at the sea-shore in collecting material for the elaboration of this subject. He frequently visited Normandy and Brittany, and found Cherbourg better adapted for study than any other locality. He was often accompanied by Riocreux, with whose exquisite drawings all botanists are familiar, and it was at Cherbourg that he enjoyed the society of Bornet and Lejolis. The Algæ of the coast of the North of France were studied by these botanists more thoroughly than those of any other coast have ever been. In midwinter as well as summer collections were made, and the life-history of the different species was cleared up as it never could have been in the laboratories of Paris. At length, however, the climate of Cherbourg and the exposure to the water in winter affected Thuret's health, and, being troubled with asthma, he sought a residence on the Mediterranean, where there would be an abundance of Algæ and a mild climate. Unfortunately, collecting on the Mediterranean is not easy, as there is almost no tide, and the algologist is at the mercy of the wind. At length Antibes was selected as a spot suitable for a residence and at the same time convenient for collecting, and a tract of rather wild-looking land was purchased, which soon became one of the famous gardens of Europe, in spite of the belief of the neighbouring villagers that nothing would grow there. Into this retreat Thuret withdrew in company with his friend Bornet, and it is in connection with Antibes that the latter part of his life is always associated, as he only left his garden when the heat of summer drove him to the Atlantic shores.

One who has travelled in the South of France will not easily forget the picturesque beauty of Antibes, situated halfway between Nice and Cannes, with a magnificent view of Nice sheltered by snow-covered mountains on the one hand, and on the other the Estrelle and the historic island of Sainte Marguérite. The brilliant canvas of Horace Vernet in the Louvre recalls the time when Antibes was not only picturesque, but an important naval station of France; but now the only excitment is an occasional cavalcade of English tourists from Cannes, and the inhabitants are as tranquil as the remains of their Roman amphitheatre. Situated on a slight eminence of what is known as the Cap d'Antibes, M. Thuret's house commanded a beautiful view of the Bay of Nice, and on clear mornings the tips of the mountains of Corsica could be seen in the far south. The lawn which extended on both sides of the house was in the spring brilliant with the flowers of *Anemone coronaria*, while clambering over the porch and covering one side of the house was a magnificent *Bougainvillea*, whose purplish-rose flowers were in striking contrast with the smaller Cacti and succulent plants beneath. On the opposite side of the house stood a group of odd-looking Proteaceous plants in fruit, which seemed like strangers who had just stepped out of the house to enjoy the view. Beyond the lawn rose a cluster of shrubs and trees, the central point of which was a large *Eucalyptus globulus*, whose dark drooping leaves were relieved by brilliant masses of Acacia blossoms, whose fragrance filled the garden. It is unnecessary to dwell upon the beauties of the garden, upon the rockwork covered with rare species of *Sedum*, *Sempervivum*, *Mesembryanthemum*, *Aloe*, the curious shrubs hidden under the trees, the *Liliaceæ*, which the visitor from the north could hardly believe were growing wild, the vivid green of the camphor trees, the sombre drooping *Casuarinæ*, the glittering foliage of *Grevillea robusta*, or the picturesque irregularity of the olives.

Surrounded by all that a delightful climate and a prolific vegetation could afford, Thuret devoted himself without interruption to the care of his garden and to his studies in the company of his friend, Dr. Edouard Bornet, a pupil of Leveillé, with whom he had become acquainted in Paris, and with whom he had passed considerable time at Cherbourg. Between these two botanists there existed a most intimate friendship. Although personally very unlike, they were one in sympathy, one in their devotion to science, in their love of minute investigation, in their generous treatment of younger botanists. Thuret was tall, and his complexion seemed light as his hair had become rather gray. His manner was stately without being formal, and in conversation he spoke slowly. Bornet, on the contrary, was short, of very dark complexion, and spoke rapidly. Thuret was slightly English in his manner, Bornet decidedly French. In his villa at Antibes, Thuret was sheltered from the crowd of tourists who winter at Nice and Cannes, and even visits from his botanical friends were not very frequent. At different times younger botanists visited Antibes for the purpose of studying Algæ, and to such he was always most friendly, placing his books and collections at their disposal. That none came to Antibes who were not charmed by his hospitality, and astonished at his minute knowledge of Algæ, Woronin, Faminzin, Janczewski, Rostafinski, Cornu, and the writer of this notice can testify. His house was full of drawings, notes, and preparations of Algæ, and it required but a single question to start him upon a dissertation, if one may use the word, which was often prolonged to several hours, to the delight, at the same time discouragement, of his younger hearers. When the heat of summer became intense, Thuret left with Dr. Bornet for Paris, and, after remaining with their families and friends there for a few days, they kept on to the Atlantic shore, and studied until the cooler weather of autumn allowed them to return to Antibes.

Generally some special plant or group of plants was selected for summer study, and a spot was chosen where they could be found growing in abundance. The summer of 1873 was spent at Biarritz in working up the development of *Polyides rotundus*, the results of which have not yet been published, and the summer of 1874 was passed at Cherbourg, where Thuret's health did not permit him to collect as usual. In the autumn of the latter year he returned to Antibes as usual, and, although his health was feeble and he suffered much from asthma, there was no immediate apprehension on the part of his friends. On the 10th of May, 1875, however, as he was on a visit to Nice, he was taken suddenly ill, and died, without warning, of *angina pectoris*. For his friends there is only the mournful satisfaction that he was spared long physical suffering, and that his devoted companion for years was not absent in his last moments.

The time has not yet arrived correctly to estimate the position which Thuret holds in science, and it would be presumptuous, in any event, for us to attempt such a task; but we may be allowed to consider some of his chief characteristics as an investigator and writer. His published works are unfortunately few in number, for, although he had accumulated an immense mass of notes and drawings, he was constantly afraid of falling below his own ideal, and hesitated to give the results of any study to the world until it had been thoroughly elaborated. At his death he bequeathed his manuscripts and drawings to Dr. Bornet, with the expectation that he would superintend their publication. When this is done botanists will be able to realise how much Thuret has effected for science. Judging only from what has been already published, the scientific reputation of Thuret rests principally on his algological work, notably on his "Recherches sur les Zoospores des Algues et les Anthéridies des Cryptogames," published in 1850; "Recherches sur la Fécondation des Fucacées suivies d'Observations sur les Anthéridies des Algues," published in 1857; and "Recherches sur la Fécondation des Floridées," published in conjunction with Dr. Bornet in 1867. The first-named work is an abridgment of the essay which received the prize of the Academy, and which Thuret intended to publish afterwards in full. Those who study land plants have little idea how much labour was involved in searching in all weathers for material for this work. The term spore, as applied to the olive-coloured seaweeds, was used in the vaguest way. Thuret first showed that few of these bodies germinated as simple spores, but that a great majority of them were sporangia, containing zoospores in unicellular or pluricellular cavities. He defined the Order *Phæosporæ*, and brought order out of confusion. He also recognised the presence in this Order of bodies which he considered to be antherozoids; but he was never able to see the copulation of zoospores described by Areschoug in *Dictyosiphon hippuroides.* In some of the green seaweeds, as *Ulva,* he recognised the presence of two kinds of zoospores, the micro- and macrozoospores. The "Recherches sur la Fécondation des Fucacées" seems to us the work in which Thuret appears to best advantage as a writer. The subject itself is interesting, and is admirably treated. It is a model of scientific writing. An important physiological discovery, the fertilisation of a mass of protoplasm by means of numerous antherozoids which cause it to revolve and afterwards take on a coating of cellulose, is communicated in language neither too diffuse nor too concise. Here we see the secret of his success as a writer. He always tells his story simply, without overwhelming the reader with unimportant details or beating about in all directions to attract attention to his subject. The "Recherches sur la Fécondation des Floridées" illustrates the freedom from preconceived theory which characterised Thuret. Naegeli had figured a body which he dismissed with a short notice, as, on his theory, it could have nothing to do with the fertilisation of *Florideæ.* Struck by Naegeli's figure, but not prejudiced by any peculiar view of what fertilisation in the *Florideæ* ought to be. Thuret examined and found in the body figured by Naegeli the trichogyne, the key to the understanding of the fertilisation in this Order. Thuret was a generous correspondent, and was in the habit of furnishing valuable notes to his friends, some of which have become public. He wrote no treatise on the classification of Algæ unfortunately, but in a note published by Lejolis in his "Liste des Algues Marines de Cherbourg," he gives briefly his views on this subject. Instead of regarding the *Fucaceæ* as the highest of the Algæ, he places the *Florideæ* at the head of the list, a view with which most, if not all, recent writers agree.

To compare Thuret with other algologists would be difficult. He did not pretend to be able to determine foreign species as Agardh or Harvey. Although his herbarium was large, he did not attempt to increase his foreign exchanges, thinking that, beyond a certain point, the collection mastered the botanist rather than the botanist the collection. To him Algæ meant not the red and green things packed away in herbaria, but the plants which cling to the rock, which wave in pools, to which every returning tide brings a new phase of existence, to which the change of season means death or a renewal of life.

With this preference for observations on the shore, it is not strange that he regarded Mrs. Griffiths as a better algologist than Harvey, or that he urged his friends to go to some locality on the coast in autumn or winter and study thoroughly what grew there, rather than make a short excursion in midsummer, when Algæ are not numerous or in good condition, and mount a large number of specimens, to be soaked out in fresh water for winter study. Lamouroux, Bory, Chauvin, Montagne, and others had advanced algological science in France as far as was possible by the study of herbarium specimens alone. Thuret, with his followers, Bornet, Lejolis, Derbes, Solier, and we might, perhaps, with propriety add the Crouan brothers, by taking their microscopes to the shore have placed France at the head of the list as far as an accurate knowledge of marine Algæ is concerned.*

W. G. Farlow.

ON A COLLECTION OF FERNS MADE IN SAMOA BY THE REV. S. J. WHITMEE.

By J. G. Baker, F.L.S.

The Rev. S. J. Whitmee, of the London Missionary Society, has lately sent home from Samoa a large collection of Ferns and other plants. As the Ferns include not only several novelties, but also several interesting extensions of range, I proceed to give here an account of the series. A specimen of each has been laid into the Kew Herbarium, and it is intended that the rest should be made up into sets and distributed. The numbers first given are those under which the plants are sent by Mr. Whitmee, and the second number with a star within brackets before the name of the novelties indicates the position of the plant in the arrangement followed in our Synopsis.

1. Gleichenia oceanica, *Kuhn.* Doubtfully distinct from *G. flagellaris*, Spreng.

2. dichotoma, *Willd.*

4, 93. Cyathea propinqua, *Mett.*

(54*). SAMOENSIS, *Baker*, n. sp. Frond ample, tripinnate. Rachises castaneous, those of the pinnæ matted with brown tomentum. Pinnæ oblong-lanceolate, 1-1½ foot long, 5-6 inches broad at the middle. Pinnules sessile, ligulate, caudate, the largest 2½-3 inches long by ½-⅝ inch broad, cut down to the rachis into close, blunt, deeply crenate, tertiary segments ⅛ inch broad. Texture coriaceous; both surfaces slightly furfuraceous. Veins 8-9-jugate, indistinct, the lower forked low down. Sori crowded, costular, absent only from the tips of the segments. Involucre large, brown, persistent, breaking up irregularly. Sent by Mr. Whitmee without a number, mixed with *Alsophila truncata.*

6. Alsophila truncata, *Brack.*

11. Hymenophyllum emarginatum, *Sw.*

10. *var.* microchlamys, *Baker.* A form with involucral-valves scarcely broader than the tips of the segments.

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* The writer is indebted for several dates in the life of Thuret to an article in the "Botanische Zeitung," written by Dr. Joseph Rostafinski.

12, 14 (21*). HYMENOPHYLLUM SAMOENSE, *Baker*, n. sp. Rhizome filiform, wide-creeping. Stipes 2-3 inches long, naked, winged in the upper half. Lamina oblong-deltoid or rhomboid, tripinnatifid. Rachis furnished with a narrow, uncrisped wing. Pinnæ, excluding the simple upper ones, 6-10-jugate, ascending or patulous, the 2-3 lowest pairs about equal in size or lowest reduced, cut down into a few distant, ligulate, divaricating, erecto-patent lobes 1-3 lines long, with a single central nerve. Surfaces free from hairs, and teeth none. Sori terminal on the lateral segments of the pinnæ. Involucral-valves oblong, nearly a line long, twice as broad as the tip of the segment, free from one another down to the base, faintly toothed round the tip. Approaches closely the non-crispate forms of *H. javanicum*.

15. Hymenophyllum multifidum, *Sw.*
23. Tunbridgense, *Sm.*
21. Trichomanes Filicula, *Kaulf.*
20. digitatum, *Sw.*
18. parvulum, *Poir.*
32. peltatum, *Baker.*
24. javanicum, *Blume.*
31. caudatum, *Brack.*
27. gemmatum, *J. Smith.*
28, 29. maximum, *Blume.*
26. apiifolium, *Presl.*
8. Dicksonia Brackenridgei, *Mett.*
51. samoensis, *Baker.* Known to us in England before only by Brackenridge's excellent figure.
34. Davallia heterophylla, *Smith.*
38. Emersoni, *Hook.* New to Polynesia.
37. contigua, *Sw.*

40 (34*). PLUMOSA, *Baker*, n. sp. (section *Eudavallia*). Rhizome wide-trailing, as thick as a quill, densely clothed with dark brown, spreading, hair-like scales 3-4 lines long. Stipes dull brown, naked, firm, erect, 5-6 inches long. Lamina deltoid, half a foot long, tripinnatifid, smooth, naked, glossy, subcoriaceous, like its allies turning brown when dried. Lower pinnæ much the largest, stalked, deltoid. Ultimate divisions linear-ligulate, cuneate at the base, the largest 2-2½ inches long, ⅜ inch broad, cut about halfway down to the rachis into a series of close, regular, erectopatent, blunt, often emarginate lobes. Veins fine, immersed, obscure, erecto-patent, 1 or 2 running into each ultimate lobe. Sori not seen. Midway between *pentaphylla* and *solida*.

39. Davallia pallida, *Mett.* (D. Mooreana, *Masters*, Gard. Chron., 1864, p. 964, cum icone). Fine specimens sent by Mr. Whitmee from Savaii. Gathered by Macgillivray in Aneiteum, and introduced recently by Messrs. Veitch into cultivation.

41, 43b, 44. Davallia solida, *Sw.* Varieties.
43a. elata, *Sw.* (epiphylla, *Forst.*)
46. moluccana, *Blume.*
172. Speluncæ, *Baker.*
49. stolonifera, *Baker.*

56. Hypolepis tenuifolia, *Bernh.*
53. Lindsaya lobata, *Poir.*
57. Pellæa geraniæfolia, *Fée.*
58. Pteris ensiformis, *Burm.*
59, 60. quadriaurita, *Retz.*
63. marginata, *Bory.*
69 ex parte. Lomaria vulcanica, *Blume.*
,, procera, *Spreng.*
,, lanceolata, *Spreng.*
71. Asplenium Nidus, *L.*
72. feejeense, *Brack.*
75. multilineatum, *Hook.* Showing the curious dimorphic, decompound, barren fronds discovered by Mr. Powell.
77, 78. Asplenium resectum, *Smith.*
81 ex parte. falcatum, *Lam.*
,, lobulatum, *Mett.*
79. caudatum, *Forst.*
affine, *Sw.*
laserpitiifolium, *Lam.*
84. multifidum, *Brack.* A fine series of specimens of this little-known species, throwing doubt upon the distinctness from it of *A. Powellii*, Baker.
89. japonicum, *Thunb.* A good series of the typical Japanese form.
86. esculentum, *Presl.*
88. decussatum, *Sw.*
92. Aspidium aristatum, *Sw.*
110. Nephrodium Brackenridgei, *Baker.*
103. Harveyi, *Baker.*
107. dissectum, *Desv.*
113. intermedium, *Baker.* New to Polynesia.
111. davallioides, *Baker.*
94. Leuzeanum, *Hook.*
171. molle, *Desv.*
97. unitum, *R. Br.*
100. truncatum, *Presl.*
102. latifolium, *Baker.*
101b. decurrens, *Baker.*
118. Nephrolepis cordifolia, *Presl.*
117. ramosa, *Moore.*
119. *var.* trichomanoides, *J. Sm.*
115. acuta, *Presl.*
116. *var.* rufescens, *Presl.*
120. Oleandra neriiformis, *Cav.*
121 (3*). WHITMEI, *Baker*, n. sp. Rhizome trailing, suffruticose, flexuose, as thick as a quill, clothed with dense, spreading, linear, acuminate, membranous, pale brown scales 3-4 lines long. Stipe 6-18 lines long, scaly, with a distinct swollen articulation about halfway down. Lamina linear-ligulate, simple, 10-18 inches long, 12-21 lines broad, acute, cuneate or narrowly rounded at the base, membranous, both sides bright green, the upper glabrous, the lower and edge minutely pubescent, the midrib beneath

clothed throughout with spreading linear scales like those of the rhizome in colour and texture. Veins spreading from the midrib nearly at a right angle, simple or once forked, about ⅓ line apart. Sori irregularly biserial in the inner half of the frond, any near the midrib only in the upper sixth of the frond, the rest mostly in an irregular row 2-3 lines from the midrib. Involucre reniform, persistent, a line broad; edge not ciliated. Represents in Polynesia the African *O. articulata*, Cav. Discovered in an excursion to the island of Savaii by Messrs. Whitmee and Powell.

123 ex parte (105*). Polypodium (Grammitis) simplex, *Baker*, n. sp. Caudex oblique. Stems densely tufted, very short, naked. Lamina simple, ligulate, thin, subcoriaceous, glabrous, 4-6 inches long, 1½-2 lines broad, narrowed very gradually to both ends. Veins immersed, obscure, deeply forked, bearing the sorus at the base of the upper fork almost parallel with the rachis. Sori oblong, immersed so that the back is slightly raised, forming a row on each side close to the costa in the upper half of the frond, with a distinct gap between each. Near *P. gramineum* of the West Indies, from which it differs by its very short stipe, thinner texture, and costular sori.

123 ex parte. Polypodium (Grammitis) marginellum, *Sw.* Known before only in South America, the Cape Verde Islands, and St. Helena.

124. (100*). Polypodium (Eupolypodium) Whitmei, *Baker*, n. sp. Rhizome short-creeping, densely clothed with linear, pale brown, membranous scales under ¼ inch long. Stipe ¼-1 inch long, stiff, erect, densely clothed throughout with conspicuous, spreading, brown, bristly hairs. Lamina simple, ligulate, 6-9 inches long, ½-⅝ inch broad at the middle, narrowed gradually to both ends, thin, subcoriaceous, naked, except a few obscure scattered hairs on the margin. Veins erecto-patent, immersed but distinct, with 1 or 2 branches. Sori round, superficial, terminal, on a branch of main vein, forming a long row nearer edge than midrib.

129 (216*). Polypodium (Eupolypodium) sertularioides, *Baker*, n. sp. Rhizome short-creeping. Scales linear, pale brown, dense, spreading, ¼ inch long. Stipe wiry, erect, hispid, ½-1 inch long. Lamina lanceolate, 6-9 inches long, 15-24 lines broad at the middle, narrowed to both ends, copiously bipinnate, rigid in texture, the straight rachis hispid throughout, and the midrib of pinnæ and end of the pinnules furnished with the same bristly hairs. Pinnæ 40-50-jugate, close, sessile, regularly pectinate, at most an inch long, under ¼ inch broad, cut down to the rachis into distinct, parallel, entire, erecto-patent pinnules under half a line broad. Veins one central to each pinnule. Sori round, one at the base of each pinnule, like *tamariscinum* in cutting and texture, but recognisable at a glance by its basal sori.

132. Polypodium (Niphobolus) adnascens, *Sw.*

133. (Phymatodes) accedens, *Blume.*

137 (364*). expansum, *Baker*, n. sp. (P. dilatatum, *Hook. & Baker*, Syn. Fil., p. 365, ex parte, non Wall.) Rhizome short-creeping, ½ inch thick. Stem stout, naked, a foot

long. Lamina rhomboid, 3 feet long, a foot broad, narrowed to both ends, cut down nearly to the rachis throughout into simple, close, patulous, lanceolate, acuminate pinnæ 1-1½ inch broad. Pinnæ about 20-jugate; wing of main rachis an inch broad. Texture membranous; rachis and surfaces quite glabrous. Main veins rather distinct halfway to the edge; areolæ fine, with copious, free, included veinlets. Sori round, not immersed, scattered irregularly, 3 or 4 between midrib and edge. This is the Samoan plant we have referred to *P. dilatatum*, but this fuller supply of specimens shows it to be distinct. It differs from the Himalayan plant by its much less numerous, larger sori and less distinct main veins. It is probably the *Drynaria acuminata* of Brackenridge's Ferns, p. 47, but he has used the same name for a totally different plant at p. 41.

136. Polypodium Powellii, *Baker*.
135. nigrescens, *Blume*.
134. phymatodes, *L*.
139. Monogramme Junghuhnii. *Hook*.
73. Gymnogramma javanica, *Blume*.
141. lanceolata, *Hook*.
146. Vittaria scolopendrina, *Thwaites*. New to Polynesia.
147. elongata, *Sw*.
143. Antrophyum Grevillei, *Balfour* (angustatum, *Brack.*)
142. semicostatum, *Blume*.
66. Acrostichum repandum, *var*. Quoyanum (*Gaud.*).
153. aureum, *L*.
156. Marattia fraxinea, *Smth*.
155. Angiopteris erecta, *Hoffm*.
164. Schizæa dichotoma, *Sw*.
170. Lycopodium serratum, *Thunb*. New to Polynesia.
166. cernuum, *L*.
167. Phlegmaria, *L*.
160. Selaginella Arbuscula, *Spring*.
158. latifolia, *Spring*.
157a. inæqualifolia, *Spring*.
163. Psilotum complanatum, *Sw*.

ON AN ASIATIC *CENTROLEPIS*.

By H. F. Hance, Ph.D., &c.

In the early spring of the present year I had the opportunity of passing five days at Saigon, the capital of French Cochinchina, where it was my privilege to make the personal acquaintance of M. Louis Pierre, Director of the Botanical Gardens. This gentleman, who is ardently devoted to botany, has explored with the greatest perseverance and resolution, sometimes at the risk of his life, various portions of the little-known interior of Cochinchina and Cambodia, and has collected several thousand plants, all of which he has preserved by poisoning, and packed away in chests for ultimate distribution, having at the time of collection made careful notes, and frequently also dissections and drawings, of those he judged of chiefest interest. During two most pleasant days spent with M. Pierre, and in which he showed me all the plants still unpacked it was possible to look through, most liberally pressing on me specimens of those which appeared to me remarkable or new, we had much conversation on the flora of the country, and my host expressed an opinion that it would not be found to yield any large amount of novelty. I was obliged to dissent from this view, and the slight opportunities I have since enjoyed of examining the plants I brought away with me serve entirely to confirm my opinion, a conclusion to which, moreover, the many new species detected in Malacca by the late Dr. Maingay would have led me independently. The flora in general character is that of Tenasserim and the Malayan peninsula and archipelago; but it is certain that a considerable proportion of the species have not as yet been found, or at any rate described as occurring there. I have quite recently been enabled to characterise in the pages of this Journal* three new Oaks from Cambodia, obtained by M. Pierre; and I trust, if leisure is granted, to be able hereafter to enumerate some others of the most interesting or novel of the plants I owe to his liberality.

Among those which more especially arrested my attention was the *Centrolepis* of which I subjoin a diagnosis. The small genus to which it belongs comprises a dozen species or thereabouts, none of which had heretofore been detected beyond the Australian continent. Somewhat similar instances are furnished by *Stylidium uliginosum*, Sw., with one exception the sole Asiatic species in a genus comprising eighty-five; by *Calogyne chinensis*, Benth., detected by me some years ago at Amoy; and by the Hongkong *Thysanotus chinensis*, Benth.: but in all these cases the extra-Australian species are met with in the extreme S.E. corner of Asia, whereas the new *Centrolepis* was discovered between six and seven hundred miles further to the west. However, *Stylidium tenellum*, Sw., is a parallel instance. It is worthy of notice that in each case the nearest allies of the Asiatic plants are natives of Northern and Eastern Australia.

CENTROLEPIS CAMBODIANA, *sp. nov.*—Dense cæspitosa, radicibus fibrosis, scapis teretibus strictis inferne pilosis 3-8 poll. longis, foliis setaceis longe pilosis basique pilis longis articulatis dense lanosis scapo fere duplo brevioribus, spathis æqualibus inferiore culmum continuante rigida superiore brevissime pedicellata basi articulata mobili ovalibus longitudinaliter nervosis pilosis (pilis omnium partium iis foliorum basium exceptis e tuberculo ortis) margine albido ciliatis acutiusculis 3 lin. longis, receptaculo nudo, floribus 20-25, glumis 2 æqualibus oblongis scariosis albis apice denticulato-ciliatis 3 lin. longis, ovariis 6-8 vix semilinealibus, stylis basi distinctis sesquilinealibus stigmatibus simplicibus, semine ovoideo crebre verticaliter sulcato brunneo.

In ipso cacumine nudo montis Kam chai, prov. Kam pot, Cambodiæ, juxta fines Siamenses, alt. circ. 2900 ped., coll. cl. L. Pierre.

To judge from the insufficient character given—I have not seen the plant itself—a very near ally of this interesting species is *C. exserta*, Roem. & Schult., from Eastern Tropical Australia. I regret not having been able to consult the revision of the Order by Hieronymus, in the Halle Natural History Society's Transactions for 1873, where probably Brown's meagre diagnosis, modelled after the Linnean tradition, is amplified.*

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* Journ. Bot., 1875, pp. 361—372.

I cannot pretend to a good acquaintance with the curious little group to which this genus belongs; but I should say its glumaceous flowers and follicular fruits, in connexion with their singular arrangement when there are several in a flower, might fairly justify its separation from *Restiaceæ* proper. However, this is a point on which I speak with much hesitation, believing that a large proportion of the Monocotyledonous families now admitted by the majority of botanists will eventually, on a strict general revision, have to accept a merely subordinal or sectional rank, and the same with many of the genera.

ON THE HUSKLESS WALNUTS OF NORTH CHINA.

By H. F. Hance, Ph.D., &c.

In a paper full of interest, with the title "Quelques renseignements sur l'histoire naturelle de la Chine septentrionale et occidentale," published in the 7th number of the "Journal of the North China Branch of the Royal Asiatic Society" (Shanghae, 1873), the Abbé Armand David has given a brief sketch of the fauna and flora of those portions of Northern and Western China which he had visited. In this memoir he observes:—"Quelques endroits de la province de Pékin fournissent des noix qui sont naturellement dépourvus de coque." After several fruitless inquiries, Dr. Bretschneider at length procured specimens of these huskless Walnuts, of which he was so kind as to communicate some for my examination. They are of two sizes, the smaller measuring one inch, the larger one inch and a half in length. The nuts are rather thinner and more brittle than in the common Walnut, and their surface is curiously and irregularly eroded, presenting very much the appearance of sea-worn rock; the outer polished coat, in fact, is partly wanting and partly separable from the inner thin part, which it covers only in patches, and pieces of it can easily be detached by the nail. They show a tendency to split longitudinally at the side of the thickened keel formed by the junction of the valves; and the small-sized nuts (which are much thinner, indeed sometimes little more than coriaceo-cartilaginous in texture) along the middle of the valves also. Vertical and transverse sections exhibit the thin septa, and in all respects the structure of the ordinary form of *Juglans regia*, Linn., of which this is doubtless only a singular monstrosity. Except in size and the texture of the shell, I do not find anything to distinguish the two kinds of nut sent, and this tends to show that too much stress must not be laid on size, or I may add form either, in attempting to discriminate species in this genus. M. Maximowicz has himself, whilst describing and figuring with his usual care the Eastern Asiatic forms he had examined, explained that their specific distinctness is at present uncertain.* Dr. Bretschneider says this curious fruit is cultivated in the mountains to the north-east of Peking. Neither Loudon in the "Arboretum,"† where thirteen pages are devoted to the Walnut, nor M. Cassimir De Candolle in his "Mémoire sur les Juglandées,"‡ or in the monograph in the 16th volume of the "Prodromus," make any allusion to a variety or monstrosity in which the epicarp is suppressed. There is no reference to such a deformity or abortion in Moquin-Tandon's "Tératologie végétale"; nor, indeed, though I do not pretend to have made a thorough search, have I been able to find a parallel instance mentioned, of any single genus, in the books to which I have access. It seems, therefore, worth putting on record, if only for its singularity.

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* Hieronymus (l.c., p. 215) gives the following description of *C. exserta*, R. & S., apparently made from an authentic specimen:—"Radix fasciculato-fibrillosa, fibrillis subramosis. Calamus ramosus, rami contracti fasciculati foliati. Folia setacea filiformia. Pedunculi teretes pubescentes (pilis articulatis) 5-7 cm. alti, foliis duplo vel triplo longiores. Spicula bibracteata, bractearum internodio 1·1¼ mm. longo. Bracteæ florales subcymbæformes, longiores quam latæ, plurinerviæ, brevissime mucronatæ vel submuticæ, interdum violaceæ, margine membranaceæ, hyalinæ, ciliatæ (pilis simplicibus); dorso papillosæ, strigoso-pilosæ (pilis articulatis basi tumidis). Flores circiter 8-10 in axilla utriusque bracteæ cicinnum formantes, bibracteolati (rarissime tribracteolati suprema bracteola glandulæformi rudimentari) bracteolæ hyalinæ, lanceolatæ, subintegræ, apice denticulatæ. Ovaria 7-14. Styli liberi carpophorum longitudine subæquantes vel superantes."—[*Ed. J. Bot.*]

ON THE COLOURING MATTER ASSOCIATED WITH CHLOROPHYLL.

By H. C. Sorby, F.R.S. & Pres. R.M.S.

Since my attention was first called to the abstract of Pringsheim's paper on chlorophylline chromules published in the Journal of Botany (1875, pp. 114-120), I have been so much occupied with other engagements that I have not until now been able to write a short defence of the part I have taken in this subject.

According to the above-named abstract at p. 120, Pringsheim says that he "can still less agree with Sorby respecting the several chromules which he alleges to have obtained from various plants, and which he regards as distinct and undecomposed substances pre-existing in the plants and capable of definite analysis. It is certain that many of these chromules must have been deprived of their original spectrum characteristics by the treatment to which they were subjected. In the determination of the spectra, moreover, the influence of the solvents, that of concentration, and of the thickness of the layers, seem to have been equally disregarded. Sorby has nowhere stated with reference to his yellow chromules, to which he ascribes two separate bands in the blue, to what extent the various positions of the bands are influenced by the solvents, nor how they depend on the thickness of the layers; nor does he state, that with an increase of the chromule additional bands do not appear. I doubt not that the whole perhaps of his yellow chromules—one only excepted—would suddenly reveal also the chlorophyll bands of the first half, if my method were applied."

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* Mél. biolog. Acad. St. Pétersb., viii., 637.
† Arb. et Frut. Brit., iii., 1423-35.
‡ Ann. Sc. Nat., 4e sér., xviii., 5 sqq.

Now I must say, with reference to nearly the whole of these statements, that I cannot comprehend how anyone could have been led to make them if he had read my various published papers, more especially that on comparative vegetable chromatology (Proceed. R. S., 1873, vol. xxi., p. 442).

It will be seen, on referring to this at p. 444, that I never employed any reagents to separate the colouring matters but neutral alcohol, water, and carbon bisulphide, and was always most careful to check the results by the examination of the spectra of the objects in their *natural* state. These are quite as definite and distinct as those of their solutions, and, as I showed at pp. 452 to 464, the various substances are in most cases quite as much distinguished by their chemical characters as by their spectra. Thus, for example, taking the two kinds of xanthophyll which have been so commonly confounded together—my xanthophyll and yellow xanthophyll—when both are dissolved in carbon bisulphide, so that the difference in their spectra cannot be due to difference in physical state, the absorption bands of xanthophyll are situated at about wave-lengths 507 and 475 millionths of a millimeter, whereas those of yellow xanthophyll are situated at about 498 and 467. On dissolving both in absolute alcohol and adding a little potassii nitrite and hydrochloric acid to both, the xanthophyll rapidly becomes colourless, whereas the yellow xanthophyll is changed into a new splendid blue substance.

As to my disregarding the influence of the solvents on the spectra, I need only refer to what I said at p. 443. I there considered "the absorption-band-raising power of solvents" under that special heading, and in the subsequent portions of my paper I treated the subject as though this fact were so thoroughly well understood as not to need any further consideration. I always described the difference between the spectra of solutions of the various substances *when dissolved in the same liquid*, and in every other particular in exactly the same physical condition. Moreover, in describing the spectra I relied more especially on the exact position of the bands when the solutions were of such a strength as to show them to the greatest advantage. I am more and more convinced that by far the most important fact is the *exact wave-lengths of the centre of the bands* when they are seen well-defined and symmetrical on both sides of the centre. Since in many, if not in most, cases we have to deal with mixtures, the description of the absorption in other particulars is often of no value at all as a character of the individual substances. Thus, for example, the xanthophylls are almost always found mixed with lichnoxanthine, which gives rise to a very variable intensity of general absorption at the blue end as compared with that due to the bands of the xanthophyll itself, and any description of the entire absorption characters of the xanthophyll obtained from leaves would most certainly be characteristic, not of any one kind of xanthophyll, but of a variable mixture of xanthophyll and lichnoxanthine—two substances which are altogether distinct in every relation, both chemical, physical, and biological.

I am fully prepared to admit that by using a sufficient quantity there would be no difficulty in detecting the chief absorption band of chlorophyll in the xanthophylls obtained from leaves, but there is no difficulty in procuring them almost, if not absolutely, free from it by using the petals of suitable flowers. I must confess that I am astonished at the idea of supposing that substances giving spectra with all the characters which would be due to variable mixtures are separate compounds. If such a system were adopted, the whole subject of colouring matters would be so confused as to break down altogether. The principle which I have always adopted has been never to look upon any spectrum as evidence of a new and separate substance when it could be perfectly well explained by supposing it to be due to a mixture of previously recognised substances, certainly met with in an isolated or isolatable condition in closely related natural products. Pringsheim fully admits that the bands in some of the yellow substances he describes correspond exactly with those of chlorophyll. Every fact can be completely explained by supposing that this substance could not be completely separated by the method employed. There is no kind of doubt that the extent to which such separation can be effected depends on a variety of conditions still very imperfectly understood; and if we were to suppose that when we cannot separate colouring matters from one another there was evidence of some new and independent substance, their number would be all but infinite. Such minute quantities of chlorophyll may be detected by the remarkably dark band in the red, that we may almost look upon it as being like the sodium band in the case of incandescent vapours. I must say that I regard some of Pringheim's conclusions much in the same light as if anyone studying the spectrum of potassium and finding that it showed the bright yellow lines of sodium, were to conclude that he had discovered a new element forming a connecting link between potassium and sodium.

In conclusion, I must also say, that I am astonished that so few have hitherto observed the very complete proof of the normal chlorophyll of many plants being a mixture of two entirely different kinds. There is often no difficulty in seeing the characteristic bands of both in the spectrum of the living plants, especially in such green Algæ as *Ulva*, and yet, with the exception of Prof. Stokes,* no one seems to have observed the facts or appreciated their importance.

NEW LICHENS FROM THE CAPE OF GOOD HOPE.

By the Rev. J. M. Crombie, F.L.S.

Amongst the Lichens collected by the Rev. A. E. Eaton on Table Mountain, during the short stay of the Venus Transit Expedition at the Cape, there occur various novelties, which Dr. Nylander has determined for me, and from whose notes, previous to the publication of a detailed report, I extract the following short diagnoses.

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* Proceed. R. S, 1864, xiii., p. 144.

1. *Parmelia subæquans*, Nyl. Similar to *P. Borreri*, of which it may perhaps be only a variety, though differing in the receptacle of the apothecia being firmer and not sorediosо-dissolved. The margin of the receptacle in the younger apothecia is radiately sphinctrino-striated. Corticole.

2. *Parmelia molybdiza*, Nyl. Allied to *P. atrichoides*, Nyl., but having the thallus smaller, leaden-coloured, more adnate, with the apothecia lecanorine. Saxicole.

3. *Parmelia constrictans*, Nyl. Probably a subspecies of *P. conspersa*, from which it is distinguished by being smaller, stenophyllous, and having the laciniæ here and there somewhat constricted. Terricole. Var. *eradicata*, Nyl., has the thallus still smaller, thinner, the laciniæ ascending, glabrous also beneath. Muscicole.

4. *Parmelia conspersula*, Nyl. Thallus adnate, areolato-diffract in the centre; apothecia lecanorine, small, the thalline margin thin, entire. Looks somewhat like small *P. conspersa*. Saxicole.

5. *Parmelia adhærens*, Nyl. Sufficiently similar externally to *Squamaria saxicola* * *diffracta*, Ach., but in reality a true *Parmelia* (as is at once evident from the character of the spermogones), allied to *P. Mougeotii*, Schær., to which in habit and colour it bears considerable resemblance. Medulla K+yellow. Apothecia small, lecanorine, with entire thalline margin; spores ellipsoid; spermatia thinly fusiform. Saxicole.

6. *Parmelia squamariata*, Nyl. Thallus olive or chestnut-olive, appressed, adnate, indistinctly radioso-divided, crenato-incised at the circumference, where the laciniæ are rather more distinct (medulla K+, from yellow becoming cinnabarine); apothecia spadiceous, minute, lecanorine; spores ellipsoid; spermatia acutely fusiform. Saxicole.

7. *Parmelia prolixula*, Nyl. This species approaches in general appearance to *P. Dregeana*, Hmp., from which, however, as well as from *P. stygiodes*, Nyl., it is at once seen to be different from the oblong form of the spores. The apothecia are sublecanorine with subentire margin, and the spermatia are aciculari-fusiform. Saxicole.

8. *Parmelia lichinoidea*, Nyl. Thallus subsimilar to that of *P. lanata*, but deplanate, the laciniæ depressed (medulla K—). Seen only in an infertile state. Muscicole.

9. *Physcia affixa*, Nyl. Somewhat similar to *Ph. obscura*, f. *lithotea*, but thinner, more appressed, and adglutinated to the substratum. The thallus is chestnut-brown, subgranulato-unequal, and areolato-diffract in the centre, laciniato-radiating at the circumference. Saxicole.

10. *Physcia subpicta*, Nyl. Distinguished from *Ph. picta* and *Ph. ægialita*, Ach., by being smaller, and having the thallus glaucous-white, opaque, smoother, the lobules being plane and shorter at the circumference. Infertile. Saxicole.

11. *Lecanora subunicolor*, Nyl. Allied to *L. fulgescens*, but having the thallus thinner, vitelline orange-coloured, smooth, rimulose; apothecia orange, biatoroid. Saxicole.

12. *Lecanora cinnabariza*, Nyl. This differs from *L. cinnabarina*,

Ach., of which it is scarcely more than a subspecies, in having the thallus very thin, rimose, and not effigurate at the circumference, and the apothecia innate, depressed. Saxicole.

13. *Lecanora pyropœcila*, Nyl. Thallus vitelline orange-coloured, opaque, minutely granulose, scattered; apothecia golden-saffron, lecanorine, the thalline margin not prominent. Saxicole.

14. *Lecanora præmicans*, Nyl. Subsimilar to *L. ferruginea*, Huds., but the apothecia (biatorine) are more brightly coloured, the spores different in size, and the paraphyses slender.

15. *Lecanora glauco-livescens*, Nyl. Thallus glaucescent, thin, rimose, limited by a blackish hypothallus; apothecia lurid- or livid-brown, subzeorine; spores 8næ, colourless, ellipsoid, 1-septate; paraphyses slender. Belongs to the section of *L. disparata*. Saxicole.

16. *Lecanora elæophæa*, Nyl. Thallus olivaceous, depresso-granulated, thin, determinate; apothecia brown, more or less convex, with thin, entire, or excluded thalline margin; spores ellipsoid or fusiformi-ellipsoid, 1-septate. Spermogones with somewhat long, shortly articulated arthrosterigmata. Belongs to the same section as the preceding. Saxicole.

17. *Lecanora galactiniza*, Nyl. This species differs from *L. galactina*, Ach., more especially by the smaller brown apothecia and the chemical reaction of the thallus (K+yellow), in which latter respect it is also to be distinguished from *L. galactinella*, Nyl. It belongs to the section of *L. subfusca*. Saxicole.

18. *Lecanora psaromela*, Nyl. Very closely allied to *Lecanora psarophana*, Nyl. Pyr. Or., p. 10, but differing, amongst other marks of distinction, in the planer and darker (almost black) apothecia and the longer spores. The spermatia are fusiformi-bacillar. Saxicole.

19. *Lecanora diffusilis*, Nyl. Thallus white or whitish, unequal, rimose; apothecia black, lecideine, innate, immarginate, often confluent and deformed; spores ellipsoid. Spermogones not seen. Apparently belongs to the section of *Lecanora atra*. Saxicole.

20. *Pertusaria Wawreanoides*, Nyl. Sufficiently similar to *P. Wawreana* Mass., but the thecæ are two-spored. Thallus K+yellow, then cinnabarine-red. Spermatia bacilliform or bacillari-fusiform. Saxicole.

21. *Pertusaria subdealbata*, Nyl. This species approaches to the preceding, but the apothecia are innate in convex protuberances of the thallus (one in each protuberance), and the spores are smaller and the spermatia straight. Saxicole.

22. *Pertusaria vepallida*, Nyl. Allied to *P. erubescens*, Tayl., but having, amongst other differential characters, the thallus thinner, pale whitish, and smooth, and the spores smaller. The spermatia are straight. Saxicole.

23. *Urceolaria subcuprea*, Nyl. Thallus lurid-brown (K—, I—), thin, areolato-rimose, obsoletely whitish-reticulated on the surface; apothecia blackish, innate, at length pertuse above; spores colourless, murali-divided, ellipsoid; spermatia thinly fusiformi-oblong. Approaches to *U. dentaria*, Nyl., Lich. St. Paul. Saxicole.

24. *Lecidea chlorophæata*, Nyl. Thallus greyish-green, thinly granulose, thinnish, indeterminate; apothecia brownish, at length convex and often aggregated, whitish within; spores acicular, straight, thin, indistinctly 3-5-septate. Saxicole.

25. *Lecidea subalbicans*, Nyl. Thallus whitish, subopaque, thin, minutely areolato-diffract, subrugulose (K+yellowish); apothecia brownish, small, plane, the margin paler; spores ellipsoid, paraphyses not well discrete; spermatia arcuate. Approaches to *L. albicans*, Nyl. Saxicole.

26. *Lecidea granulosula*, Nyl. Differs from *L. enteroleuca*, Ach., chiefly in the yellow, minutely granulose or subleprose thallus. Apothecia convex, immarginate, entirely whitish within. Saxicole.

27. *Lecidea incuriosa*, Nyl. Thallus whitish, thin, granulated or granulato-subareolate, unequal (K+yellow); apothecia black, at length convex, immarginate, concolorous within; spores 8næ, brown, 1-septate. Belongs to the section of *Lecidea* (or perhaps rather *Lecanora*) *spuria*, Schær. Saxicole.

28. *Lecidea subtristis*, Nyl. Thallus brown, very thin, smooth, rimulose; apothecia black, plane, margined, whitish within; spores 8næ, brown, bilocular. Spermogones not seen. Saxicole.

NEW LICHENS FROM KERGUELEN'S LAND.

By the Rev. J. M. Crombie, F.L.S.

No II.

In addition to those enumerated in the Journal of Botany, 1875, pp. 333-335, there occur also the following novelties in the collection made by Mr. Eaton.

1. *Lichina antarctica*, Cromb. At first sight not unlike some small state of *L. confinis*. Apothecia and spermogones enclosed in subglobose, crowded, fastigiate clavuli; spores ellipsoid; spermatia oblong. Saxicole.

2. *Lecanora diphyella*, Nyl. A peculiar species, allied apparently to *Lecanora diphyes*, Nyl., but differing in the smaller apothecia, the black hypothecium (K+violet-purple), and the thicker spores. Spermogones not seen. Saxicole.

3. *Lecanora broccha*, Nyl. Thallus whitish, very thin; apothecia brown, moderate, psoromoid in appearance; spores ellipsoid, simple. Spermogones not seen. Caulicole and muscicole.

4. *Lecanora sublutescens*, Nyl. Entirely similar in appearance to *L. lutescens*, DC., but saxicole, and the spores not seen rightly evolute. Thallus sulphur-coloured, subleprose (Ca. Cl. + saffron-coloured).

5. *Lecidea subassentiens*, Nyl. Allied to *L. diasemoides*, Nyl., but differing in the somewhat smaller spores and longer spermatia. In external appearance it sufficiently agrees with *L assentiens*, Nyl., but a microscopical analysis shows it to be quite different. Saxicole.

6. *Lecidea asbolodes*, Nyl. Thallus fuliginous, thin, determinate; apothecia black, margined, sufficiently small; spores shortly ellipsoid, paraphyses slender. In external appearance it bears a near resemblance to *Lecidea leiotea*, Nyl., which, however, differs in the immarginate apothecia and the thicker paraphyses. Saxicole.

7. *Lecidea sincerula*, Nyl. This is *Lecidea Dicksoni*, Ach., typical, with normal greyish thallus, which previously had been unknown. Similarly *L. subcontinua*, Nyl., occurs also with a normal, smooth, leaden-coloured thallus. Saxicole.

8. *Lecidea cerebrinella*, Nyl. Similar to *L. cerebrina*, Ram., but smaller, the apothecia and spores both being less in size. The apothecia are much plicato-corrugated. Saxicole.

9. *Verrucaria obfuscata*, Nyl. From *V. obnigrescens*, Nyl. this species differs in the thallus being umbrine-black, continuous, very thin or subevanescent, and in the spores, which are oblongo-ellipsoid, being somewhat longer. Saxicole.

10. *Verrucaria Kerguelena*, Nyl. Thallus greyish, obsolete; apothecia moderate, prominent, hemisphærical, pyrenium dimidiate, black; spores 8næ, colourless, ellipsoid, murali-divided, moderate; paraphyses slender, crowded. A somewhat remarkable species, belonging to the section of *V. thelostomoides*. Saxicole.

ON THE OCCURRENCE OF *MEDICAGO LAPPACEA*, *Lamk.*, IN BEDFORDSHIRE; WITH SOME ADDITIONS TO THE RECORDED FLORA OF THAT COUNTY.

By R. A. Pryor, B.A., F.L.S.

During the past summer I came across a *Medicago* in Bedfordshire, which was at first sight unknown to me, but which turned out to be *M. lappacea* of Lamarck's "Encyclopédie Méthodique." It has been noticed once or twice before in Britain as an evident introduction with wool or foreign seeds; but it is less easy to account for its occurrence in the present instance. Growing by the road between Luton and Caddington, near Farley Green, in company with *Plantago lanceolata* and *P. major*, *Polygonum aviculare*, *Matricaria inodora*, and the ordinary wayside weeds of the district, it had quite the appearance of a native, and unless it could have been brought in with material from abroad for plaiting—the great industry of that part of the country—it is difficult to see by what means it could have been conveyed into rather a sequestered neighbourhood, which is out of the course of general traffic, and where, too, it seemed to have made itself quite at home.

It is easily distinguished from *M. maculata*, with which it has perhaps sometimes been confused, by the laciniate stipules, the loose spiral and very different venation of the pods, which are flatter and not narrowed into the thin edge, with longer spines that are generally hooked at the end; the leaves are never spotted, and the flowers are of a different shade of yellow, with the keel shorter than the wings.

With *M. denticulata* it is much more closely allied. It has generally fewer flowers; the large, subglobose, burr-like pods are less deeply and regularly veined, and the veins themselves take a different direction; the uppermost whorl is larger in proportion, and covers much more of the next; the spines are radiant, standing out horizontally, and are not set on at an oblique angle; the seeds also are said to be rather oblong than reniform; the whole plant is coarser and ranker, and of a more succulent leafy habit. The blackness of the spines (hence compared to eye-lashes), so much insisted upon by the earlier writers, is by no means conspicuous in the Bedfordshire plant, or, indeed, usually in foreign specimens.

M. lappacea was first separated by Desrousseaux in Lamarck's "Encyclopédie Méthodique," t., iii., p. 637, but was well-known to the older botanists. The pods have been twice figured, perhaps not very characteristically, by Morison (Hist. Oxon., ii., p. 154, n. 16; sect. ii., tab. 15, fig. 11, *Medica cochleata ϖολυκαρϖος capsula spinosa minore, perennis, ciliaris, seu capsulis ciliaribus nigris;* and no. 18, sect. ii., tab. 15, fig. 13, *Medica cochleata minor ϖολυκαρϖος annua capsula nigra hispidiore*). It is the *Medicago polymorpha ciliaris* (not, however, *M. ciliaris* of Willdenow and De Candolle) and *M. p. nigra* of Linnæus, Sp. Pl., no. 9. Our plant belongs to the typical variety, *α. macroacantha* of Lowe (Fl. Mad. i., 158), *M. ciliaris*, Brotero, ii., 114, *M. muricata*, Buch, 198, 419 (not of others), *M. nigra* (W.), DC., ii., 178., *M. pentacycla*, DC., and *M. Histrix*, Tenore, *M. lappacea β. pentacycla*, DC., ii., 177, and Gren. & Godr., Fl. Fr., i., 390, *M. pentacycla*, Seubert, Fl. Azor., 48, no. 368, and *M. denticulata β. macroacantha* of Webb and Berthelot, ii., 64. As in perhaps all the other species of the section there is a short-spined form, which however passes into the type. It is then *M. Terebellum* of Willdenow, ii., 176, and Koch, 181, and *M. sardoa* of Moris. Boissier in his "Flora Orientalis," vol. ii., p. 103, places both *M. lappacea* and *pentacycla* as varieties under *M. denticulata;* the former is perhaps the variety with 2-4 whorls to the fruit, *M. lappacea α. tricycla* of Grenier and Godron. There is a full description of the usual form in the Rev. R. T. Lowe's unfinished "Manual Flora of Madeira."

M. lappacea has been so frequently confused with *M. denticulata* and other related species, that it is probably more common than has been supposed. It is a plant of waste ground, roadsides, and occasionally cultivated fields—perhaps most at home in the Mediterranean region, Western Asia (where according to Boissier it is more abundant than its allies), North Africa, and the Atlantic Islands; but it has spread itself widely through the warmer parts of the northern hemisphere. There are specimens in the Herbarium of the British Museum from the South of France; Eastern Pyrenees, collected by Petit; Toulon, Bourgeau; Hyères, J. Woods; from the neighbourhood of Genoa, Rostan; from Madeira, Banks and Solander, 1768, and Masson, 1777; and from the Canaries, Bourgeau, &c. There are others from the Happy Valley, Hongkong from ricefields, collected by J. Lamont and labelled *M. lupulina;* from New California, Douglas, originally distributed as *M. maculata;* and from Orizaba, Mexico, collected by Botteri.

It is perhaps worth mentioning that *M. maculata*, which seems to have dropped out of notice as a Bedfordshire plant, was figured originally in "English Botany," t. 1616 (as *M. polymorpha*), from a Bedford specimen sent by the Rev. Mr. Hemsted.

I may take this opportunity of recording a few other species, which I have recently met with in the same county, but which have not, I believe, been previously published for Bedfordshire.

Papaver Lecoqii. About Dunstable. *P. Lamottei* has been observed in the same neighbourhood by the Rev. W. W. Newbould, and I have seen the two plants growing together, but keeping well to their distinctive characters, in the immediately adjacent district of Herts. *P. Lecoqii* is possibly the commoner species in Beds, but I have notices of the existence of both in several widely separated localities. Two of the distinct forms included under *P. Rhœas* occur also in the Dunstable district.

Neslia paniculata. Potato field near Dunstable; I suppose a mere casual.

Arenaria sphærocarpa, and *A. leptoclados.* Both probably common in the county; the former also in cornfields.

Sagina apetala (*vera*). Walls at Luton and New Mill End; and seemingly not uncommon generally.

Melilotus arvensis. Waste ground at Luton, a single specimen, probably only a casual. It is, however, abundant in parts of Cambridgeshire, and in the adjoining districts of Herts and Essex, and this may turn out to be the case also in Beds. In north-east Herts it seems to be quite well established as a weed of arable land, and is as wild-looking as the Poppies. It would appear to have much better right to a place in the list than *M. alba*, which is with us nowhere permanent, and whose localities are always far more suspicious. *Trifolium incarnatum* occurs also about Luton, undoubtedly as a waif from cultivation.

Rubus leucostachys. Hedges near Caddington.

R. rudis. Hedge near Stockwood.

Poterium muricatum. Sides of fields at Dunstable, and abundant and apparently quite established on railway banks south of Luton.

Cratægus laciniata (cfr. a paper by Mr. Hobkirk, Naturalist, vol. iii., p. 80). Open hedgerows near Dunstable.

Callitriche vernalis. River Lea, above Luton; not in fruit, but probably this species. The *C. verna* and *C. autumnalis* of Abbot's Flora, from the figures quoted, represent in all probability *C. platycarpa* and *hamulata*, both of which have been noticed by Mr. Newbould in the county.

Linaria vulgari-repens. Railway embankment at Luton, in company with *L. vulgaris* and a profusion of *L. repens.* The seeds are apparently perfect.

Veronica polita. Dunstable.

V. Buxbaumii. With the last.

Polygonum maculatum. On soil taken from the Lea at Luton; very large plants.

P. aviculare, *microspermum*, and *rurivagum.* About Luton, Caddington, &c.

Carex paludosa. Stotfold. This is, however, probably *C. acuta* of Abbot's Flora, and perhaps also of "Newbould cat.," in "Topographical Botany," where *C. paludosa* is not given for Beds.

Rumex conglomeratus. Near Luton.

Myriophyllum spicatum, the true plant, and *Ceratophyllum aquati-*

cum, I have seen in the Lea, near Hyde Mill, within a yard or two of the county boundary, if not actually within its limits. There appears to be some doubt as to previous records, as neither plant is given for Bedfordshire in "Topographical Botany."

Iberis amara is still found in something like abundance on the corn-lands near High Down, on the borders of Herts. Its existence has long been known there (Fl. Herts, p. 25). *Fumaria Vaillantii* occurs in the same fields, and also about Dunstable, in which neighbourhood, as well as at Luton, *F. micrantha* seems to be commoner even than *F. officinalis*. The erasure indicated under *F. Vaillantii*, in "Topographical Botany" (ii., p. 592), has been accidentally misplaced, and was intended to refer to another county (Huntingdonshire).

It will be seen that most of these observations are confined to that portion of Bedfordshire which is drained by the affluents of the Thames—the Lea, the Mimran, and the Ver. It will probably be found that the Flora of this division will present many peculiarities, in the way of presence and absence, when contrasted with that of the county at large, which, with the exception of a small tract of country in the north-western angle, which is included in that of the Nene, belongs altogether to the basin of the Ouse, and of its tributaries, the Ouzel, Ivel, and Kime, and to a very limited extent the Cam. The natural districts thus defined will be available for purposes of botanical geography.

For the localities of the undermentioned plants I am indebted to the MSS. of the Rev. W. W. Newbould, by whom, or by Mr. W. O. Aikin, they were first observed in the county.

Ranunculus heterophyllus (restricted). Near Shefford.

R. pseudo-fluitans. R. Lea, above Luton.

Polygala vulgaris (true). Warden, Caddington.

Ononis spinosa. Eaton Socon, Goldington. Abbot's plant is liable to some degree of uncertainty.

Lotus tenuis. Near Bedford; between Farndish and Puddington. There is also a specimen from Hawnes in Ed. Forster's herbarium in the British Museum.

L. major. Between Luton and Dunstable; Bassmead.

Vicia gracilis. Near Clapham.

Rubus rhamnifolius. Maulden.

R. discolor. In many places.

Epilobium roseum. Caudle Ford.

E. tetragonum (true). Bedford, Elstow, &c. *E. obscurum* is not certainly known to occur.

Galium palustre and *elongatum* are both found in the county.

Arctium minus (true). Caddington, &c.

Tragopogon pratensis. *T. minor* only has been at present noticed in Beds.

Lactuca virosa. By the railway near Bedford; perhaps the remains of cultivation.

L. muralis. Between Luton and Dunstable.

Taraxacum erythrospermum. Occasionally.

Sonchus asper. In many places.

Hieracium tridentatum. Near Shefford.

Cuscuta Trifolii. Bassmead.

Myosotis lingulata. Elstow.

Thymus Chamædrys, Bassmead, Luton, Purvey.

Polygonum arenastrum. Caddington, &c.

Rumex pratensis. Near Bedford.

Atriplex erecta. Luton, Woburn Sands.

A. deltoidea. Bedford.

Salix cinerea. Harlington, Farndish.

Orchis incarnata. Bassmead. *O. latifolia* is not certainly known to occur.

Habenaria chlorantha. Bassmead.

Juncus acutiflorus. Woburn Sands.

Calamagrostis Epigejos. Bassmead. Abbot refers to "English Botany," t. 402, under *Arundo Epigejos* of his Flora. As the figure represents *Phalaris arundinacea*, there must be some doubt as to the plant intended. *C. Epigejos* is really figured in t. 403, but that plate is referred by Abbot to *C. lanceolata* (*A. Calamagrostis* of his Flora). This last has not been rediscovered in the county.

Glyceria fluitans (true).. Maulden.

There are a few other plants of some interest which, although it is some years since they were first noticed in the county, have never yet found admission into any published record; the present is perhaps not an unfavourable opportunity for giving them a permanent position in the Flora. In the herbarium of the Rev. R. H. Webb, of Essendon, which has been kindly placed at my disposal, there is a *Thalictrum* (*T. minus*, Auct.) from Flitwick, which I am unable to determine with certainty, but which is perhaps *saxatile*. *Antennaria dioica* is also well represented from the Barton Hills. Of this last I possess a specimen from another source, gathered near High Down, and probably in Beds. Both plants are new to the county list. In the same collection, and also from Flitwick, there is a fine series of examples of the narrow-leaved, laciniate form of *Pimpinella magna*. Mr. Webb's plants were all collected in 1841.

Another unrecorded species from Barton is in the Kew Herbarium, *Carex fulva*, "v. *speirostachya*." This is stated to have been collected in 1846, but the writer of the ticket is unknown to me.

Among those plants which are not strictly native, but which are not unlikely to become established in the county, *Diplotaxis muralis* and *Lepidium Draba* may be noticed. Specimens of both, collected by Mr. Conder in 1861, near Ampthill, and by the mill at Kempston respectively, are in Professor Babington's herbarium at Cambridge. So long ago as 1804 *Lepidium campestre* was observed by Abbot "on the embankment of our river at Bedford, between Duck Mill and the first sluice" (letter to Sir J. E. Smith, among Smith's MS. correspondence in the possession of the Linnean Society). It has apparently not been met with since that date. In the same series of letters there is a station given for *Ruscus aculeatus* at Oakley; the name also occurs without any locality in Davis' "History of Luton."

We must look to the Bedford Natural History Society for considerable additions to this catalogue.

SHORT NOTES.

Arabian Plant-Names.—I find in your Journal of Botany (1874, pp. 56, 57) Mr. Jackson's interesting note on *Alfa*. In reference to this let me observe, first, that the Arabian nomenclature of indigenous plants is by no means more exact than the European. On the contrary, as might be expected from the very wide range of this language, the same name is used for very different plants in different countries. Thus *Markh* or *Merkh* signifies in Egypt *Leptadenia pyrotechnica*, and in the Algerian Sahara *Genista Saharæ* (cf. Duveyrier, "Les Touareg du Nord," p. 161); *Toorfatz*, a name used in North Africa for Truffle (adopted in scientific nomenclature under the spelling of *Terfezia*), means in the Libyan Oases *Cistanche lutea* (cf. Ascherson, in Rohlf's "Quer durch Africa," ii., 284). On the other hand the same plant is differently named in different districts. Thus the well-known *Salvadora persica*, recommended to the faithful by the Prophet Mahomet for its wood, which is used for tooth-brushes, has different names, even in Arabian, in different tracts of its very large area, extending from Senegal beyond the Indus. In Arabia, Egypt, &c., it is called *Rak;* in Central Africa, *Suak* (cf. Ascherson, Bot. Zeit., 1875, where I pointed out the confusion originated by the late R. Brown's unlucky conjecture that the *Suak* was *Capparis Sodada*). In the *Halfa* question the former observation is applicable. There is no doubt that the Alfa of European commerce may be exclusively *Macrochloa tenacissima; Lygeum Spartum*, however, is known, even in some places of North Africa under the same name, used for the latter with preference in the Tripolitan provinces (cf. Duveyrier, l. c., 201, 203). In Egypt *Halfa* does not mean *Ampelodesmos tenax*, as Mr. F. G. Lloyd states. I do not know any record of the occurrence of this grass in Egypt, but the name is in general use in that country for *Eragrostis cynosuroides*, P. B. (*Leptochloa bipinnata*, Hochst., *Cynosurus durus*, Forsk. (non L.), who quotes the Arabian name, *Chalfi* (Fl. Aeg. Arab., lx.), or *Hhâlfe* (l. c., 21). As to the name *Diss* (or *Dees*, as it must be spelt more conformably to Arabian pronunciation), it is like *Halfa* used for different tall and coarse reed-like grasses and similar plants. In Algeria and the adjacent regions it means *Imperata cylindrica;* in the Libyan Oases, *Typha angustata*, Bory et Chaub.—P. Ascherson.

Rumex Hydrolapathum, var. latifolius, *Borrer*, in East Cornwall.—On the 2nd August last I discovered a few specimens of a very large Dock on the sandy shore below a low cliff at Downderry, in the parish of St. Germans, E. Cornwall, which altogether looked so peculiar as to make me quite doubtful as to what species to refer them. The root-leaves, from their great size, and the glaucous hue of the upper surface of the mature ones, seemed to suggest *R. Hydrolapathum*, but a more careful examination showed they differed from those of the ordinary form by having a more or less cordate base to their unequal sides. Then the possibility of the plant being *R. maximus*, Schreb., *R. Hydrolapathum*, var. *latifolius*, Borr., occurred to me, but I felt unable to form a decided opinion on the matter, as I had never seen a specimen of that Dock. More recently, however, the question has been settled by Dr. Trimen, who favoured me with the following opinion, on receiving a specimen or two from me:—"I have little doubt that the Dock is what we call in England *R. maximus*, or, as I prefer to call it, *R. Hydrolapathum*, var. *latifolius*, Borrer. It is perhaps a little off the strongly-marked Lewes plant, but is quite like another of Mr. Warren's Sussex specimens from Shoreham. You will be glad to know that Mr. Warren agrees in naming your plant *maximus*." So we find this Dock occurring in the widely separated counties of Cornwall and Sussex.—T. R. ARCHER BRIGGS.

QUERCUS (CICLOBALANUS) JORDANÆ, *nov. sp.*—Q. ramulis, petiolis, foliisque junioribus utrinque fulvo-tomentosis, foliis adultis integris elliptico-ovatis, apice abrupte acuminatis, coriaceis, supra glabriusculis, subtus cinereo-tomentellis; cupula zonis vix distinctis patellæformi applanata, glandem depresso-globosam basi tantum tegente.—Vulg. *Palayen.* Habit. insul. Luzon Philippinarum, reg. super. montium *Sierra del Caraballo* dict. silvas satis extensas formans, ubi eam anno 1874 legit amiciss. D. Ramon Jordana y Morena.

Species proxima *Quercubus cyrtopodæ* et *Llanosii;* a prima differt: glande omnino exserta non cupula triplo longiore; cupula solitaria, non cupulis sterilibus inferne tuberculata; foliis 5-8 centim. non 17-20 centim. longis; nervis lateralibus utrinque 8-9, non 15-19; *Q. Llanosii* ramulis glabris foliisque glabrescentibus glande que cupulam dimidio tantum superante a nostra satis differre videtur.

(From M. Laguna y Villanueva's "Apuntes sobre un nuevo Roble de la Flora de Filipinas." Madrid, June, 1875.)

Notices of Books.

Mycotheca Universalis. Cent. I., II., and III. By BARON F. THUMEN. Bayreuth. 1875.

THE mere accumulation of specimens in any branch of natural science must never be confounded by the collector with a knowledge of the science itself, yet when properly used nothing so effectually assists the learner as the actual possession and leisurely examination of a well-assorted collection of realities illustrative of the subject at which he is working; for it is universally admitted by all who have anything to do with science-teaching that the actual demonstration of a fact is of far more value to a student than any amount of verbal reiteration. Hence one great use (but by no means the only one) of herbaria, and it is from this as well as from other causes that so many mycological exsiccates find subscribers. The professed objects of these publications are various. Some, for instance, represent the distribution of certain Orders, others, and a more numerous class, illustrate the flora of various districts or countries; while one publication consists solely of economic Fungi, including useful and baneful species. The "Mycotheca Universalis," however, has a far more extensive object—namely, to illustrate the mycological flora of the whole world. As a matter of course, the success must rest in a great measure with the willingness of those interested in the subject to contribute to the work. As far as it has gone, contributors have been found in most European countries from Finland to Italy, including Denmark, Hungary, Great Britain, and various parts of Germany. The more interesting specimens, however, to English botanists, perhaps, are those derived from extra-European sources, as the United States, South Africa, and Tasmania. The energy of the editor in thus working up contributions from remote and comparatively little-known lands is very creditable, as is also the preparation and arrangement of the specimens. Of the work itself there is perhaps rather a preponderance of parasitic epiphytal species, such as the *Puccinæi*, *Æcidiæ*, and *Peronosporæ*, especially as these plants have been so well represented in other herbaria. On looking through the fasciculi, one cannot but be struck with the polygeneric nomenclature so much in vogue just now upon the Continent. Fortunately, however, the editor has retained as synonyms most of the older names, and we hope he will continue this practice, if it be only for the benefit of English botanists, for it is not always one can remember that by *Pseudoplectinia*, *Belonidium*, and *Stamnaria* nothing more is meant than *Peziza*. Amongst the transatlantic specimens we are pleased to find many species of Schweinitz, Berkeley, Ravenal, and Curtis represented. There are several new plants published now for the first time. Thus, for example, the last fasciculus contains *Æcidium ornamentale*, Klchbr., a very striking-looking fungus on *Acacia horrida*, from the Cape of Good Hope; *Urocystis magica*, Pass., upon *Allium magicum*, from Parma; *Fusarium Bagnisianum*, Thm., from Central Italy; and some others. It also includes the interesting *Cyttaria Gunnii*, Berk., on evergreen Beech from Tasmania, of which one so often hears in mycological works. CHARLES B. PLOWRIGHT.

A Course of Practical Instruction in Elementary Biology. By. T. H. HUXLEY, LL.D., Sec. R.S. Assisted by H. N. MARTIN, B.A., M.B., D.Sc. London: Macmillan and Co. 1875. (8vo, pp. 268.)

UNDER the term Biology in this country it has been for some years customary with those engaged in teaching to include Zoology and Botany; it is pretty nearly what was formerly called Natural History, though with perhaps a more special aspect towards the physiological and morphological parts of the subject. In his courses at the School of Mines Prof. Huxley has for many years given fully the characters of certain selected type plants as well as animals, as an introduction to his special zoological lectures, and since the new buildings at South Kensington have been opened he has been able in the laboratories there provided to add to this practical instruction by the actual examination of these types by the students themselves. The present book is meant to be a laboratory guide, indicating the mode of procedure in this practical biological work:—" A number of common and readily obtainable plants and animals have been selected in such a manner as to exemplify the leading modifications of structure which are met with in the vegetable and animal worlds. A brief description of each is given; and the description is followed by such detailed instructions as, it is hoped, will enable the student to know of his own knowledge the chief facts mentioned in the account of the animal or plant."

There are thirteen of these types taken in the book:—1, Yeast; 2, Protococcus pluvialis; 3, Proteus animalcule (Amœba) and colourless blood corpuscles; 4, Bacteria; 5, Moulds (Penicillium and Mucor); 6, Stoneworts (Chara and Nitella); 7, *Pteris aquilina*; 8, *Vicia Faba*; 9, Bell-Animalcule (Vorticella); 10, Freshwater Polyps (Hydra viridis and H. fusca); 11, Freshwater Mussel (Anodonta cygnea); 12, Freshwater Crayfish (Astacus fluviatilis) and Lobster (Homarus vulgaris); 13, Frog. Under each chapter we find first a short but comprehensive description of the plant or animal, and following this a tabular arrangement of the "Laboratory Work," briefly pointing out the organs and structures requiring notice, and the best method of treatment to exhibit them and their nature and relations to the best advantage. There can be no doubt of the excellence of this method of instruction, it commends itself, and has besides been proved to result in a clear and definite knowledge of quite a different kind to that derived from merely hearing or reading. To science-teachers who wish to follow out so complete a system of instruction this "Course" cannot fail to be of the greatest assistance.

H. T.

Manuals of Elementary Science—Botany. By PROF. BENTLEY. London: Society for Promoting Christian Knowledge. 1875. (12mo, pp. 128.)

THIS is intended as a very elementary and simple introduction to the study of plants. Its scope is limited to the organography of Phanerogams, and is especially adapted as an introduction to the Rev. C. A. Johns' "Flowers of the Field." The matter is to a considerable extent an outline of the author's well-known "Manual of Botany," and the treatment presents no special features for comment, save that at the end of each chapter is a series of questions on the preceding text. The low price (a shilling) of this little book, which is illustrated with 131 woodcuts, is likely to bring it into many hands where larger treatises would never come.

H. T.

Botanical News.

ARTICLES IN JOURNALS.

Annales des Sc. Naturelles (ser. 6, vol. i.).—P. van Tieghem, "New researches in the Mucorini" (t. 1-4).—E. Prillieux, "On the formation of the gum of fruit-trees" (t. 5, 6).—U. Gayon, "On the *rôle* of microscopic beings in the change of organic substances. 1. The spontaneous putrefaction of eggs" (t. 7).—B. Renault, "On the silicified plants of Autun and St. Etienne, *Botryopteris*" (t. 8-13).—A. Mayer and A. de Wolkoff, "Researches on the respiration of plants."—A. Brongniart, "Observations on the *Pandaneæ* of New Caledonia" (t. 14, 15).—J. Duval-Jouve, "Histology of the leaves of Grasses" (t. 16-18).—G. Thuret (the late), "On the classification of the *Nostochineæ*."—P. van Tieghem, "On the specific gravity and structure of the embryo in some *Leguminosæ.*"—Weddell, "On the *rôle* of the substratum in the distribution of saxicole Lichens."

Flora (October, 1875).—C. Luerssen, "Higher Cryptogams of the Hawai Islands."—W. Nylander, "Addenda nova ad Lichenographiam Europæam" (2 new British species).—J. Müller, "Rubiaceæ Brasilienses novæ."—L. Dippel, "Remarks on Dr. Sanio's paper."

November.

Silliman's American Journal.—A. Gray, "Æstivation and its terminology."

Bot. Zeitung.—P. Ascherson, "On marine Phanerogams of the Indian Ocean and Archipelago."—F. Kienitz-Gerloff, "Researches on the development of the sporogones of Livermosses" (t. 9).

Œsterr. Bot. Zeitschr.—C. Haussknecht, "On *Panicum* (*Setaria*) *ambiguum*, Guss."—F. Hauck, "Marine Algæ of the Gulf of Trieste" (contd.).—A. Kerner, "Distribution of Hungarian plants" (contd.).—J. Wiesbaur, "On forms of Oak."—S. Schulzer v. Muggenburg, "On *Hyphomycetes.*"—B. Thümen, "*Saxifraga sponhemica.*"—F. Antoine, "Botany at the Vienna Exhibition" (contd.).

Hedwigia.—J. Schroeter, "On some American *Uredineæ.*"

Botaniska Notiser.—J. E. Zetterstedt, "On the male plant of *Rumex thyrsoideus.*"—W. Berndes, "A new Scandinavian Moss."—Review of Swedish botanical literature for 1874.

Bot. Tidsskrift (1874, pt. 3).—M. J. P. Jacobsen, "Systematic and critical revision of the *Desmidiaceæ* of Denmark" (in French) (t. 7, 8.)

New Books.—"Botanischer Jahresbericht," 1874, pt. 1st (Berlin).—H. Leitgeb, "Untersuchungen über die Lebermoose," pt. 2nd (12 plates. Jena).—C. Müller, "Musci Schweinfurthiani in itineribus duobis in Africa cent. per ann. 1868-71 coll. determ et expos." (Berlin, 5mk.).

Prof. Todaro, of Palermo, has issued the first part of a folio work, "Hortus botanicus Parnormitanus," to consist of descriptions and coloured figures of new or critical plants cultivated in the Palermo Garden. Only two species are included in this first part—*Biancæa scandens*, Tod., of which *Cæsalpinia sepiaria*, Roxb., is quoted as a doubtful synonym; and *Erythrina insignis*, Tod., a handsome species long cultivated in the garden, but its original locality unknown. The plates are handsomely printed in colours, but are unnecessarily large.

The volume of Pringsheim's "Jahrbücher fur Wissenschäftlichen Botanik" for 1875 consists of memoirs by J. Reinke on the anatomy of secreting organs of leaves, with special reference to the "glands" so frequently found in connection with the teeth and petioles (with 2 plates); by Max Reess, on the reproductive process in the *Basidiomycetes;* by R. Hesse, on the germination of the spores of *Cyathus striatus*, Willd. (with 1 plate); and by A. B. Frank, on the development of certain flowers, with reference especially to the theory of interposition (with 3 plates).

Baron F. von Mueller, of Melbourne, continues to bring out his "Fragmenta Phytographiæ Australiæ," containing new plants, characters, or localities for the Australian continent. Parts 77 and 78 contain several new genera, including *Dallachya* (=*Rhamnus vitiensis*, Benth.), named to commemorate the services of Mr. John Dallachy, who has been a very assiduous collector in Eastern Tropical Australia for ten years, where he has detected many novelties.

It is so rare to have anything botanical to record published in Spain that we were glad to receive Don M. Laguna y Villanueva's paper on a new Oak from the Philippines. We have transcribed its characters at p. 28; a figure of the fruit and foliage accompanies it in the original. There are now eight species of *Quercus* known in the Philippines.

The "Ofversigt" of the Royal Swedish Academy for 1875 (No. 6, pp. 13-43) contains a memoir by O. Nordstedt on the *Desmidiæ* collected at Spitzbergen by the Swedish expedition of 1872-3. Many new species are fully described and illustrated in 3 beautiful plates drawn by the author. There are also lists of *Desmidiæ* from Russian Lapland and from Novaia Zemblia.

The Watford Natural History Society have issued a second part of their "Transactions." In Botany it contains only some notes on the observation of the periods of flowering of certain species, by J. Hopkinson and by the Rev. W. M. Hind.

Mr. Roper has lately communicated to the Eastbourne Natural History Society a paper on the additions to the Flora and Fauna during 1875. The large number of 46 Phanerogams, 2 Ferns, 3 Fungi, and 3 Lichens are enumerated.

M. H. Loret, whose Flora of Montpellier is expected before the spring, has printed in the "Revue des Sciences Naturelles" (June, 1875) some critical observations on some plants of that district, occupying 70 pages.

The "Abhandlungen" of the Bremen Natural History Society (bd. iv., heft 4, pp. 392-512) has a monograph of the *Juncaceæ* of the Cape by Dr. Buchenau, illustrated by 7 plates.

We understand that Prof. Baillon is engaged on an illustrated Dictionary of Botany, which will be published in parts, at 5 francs each, by Hachette.

The death is recorded on November 9th of Dr. Jean Charles Marie Grenier, Professor in the School of Medicine, and Dean of the Faculty of Sciences, at his native town, Besançon, for many years. He was born in 1808, and was therefore sixty-seven years of age. French Botany owes much to his labours, which have resulted in two important treatises—one the standard "Flore de France," worked out with M. Godron, and published between 1848 and 1856, in three volumes; the other the scarcely less valuable "Flore de la Chaine Jurassique," printed in two parts in 1865 and 1869,* and really, so far as it extends, a supplement to the earlier work. M. Grenier was also the author of many papers on French plants in the local transactions published at Strasburg, Bordeaux, and Besançon, and in the Bulletin of the French Botanical Society; his descriptions are characterised by great carefulness and lucidity, with a tendency to perhaps over-refinement, though he was not a splitter of the extreme type.

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* See notices in Journ. Bot., 1865, p. 195, and 1870, p. 46.

Original Articles.

ON THE SPECIES OF *GLYCOSMIS*

By S. Kurz.

(Tab. 174, 175.)

In the present paper I have attempted to distinguish the forms which Prof. Oliver and Dr. Hooker have combined into one single variable species, viz., *Glycosmis pentaphylla*. As regards the species of the first section with the filaments dilated upwards, I feel sure of their validity, although some may be inclined to look upon *G. lanceolata* as a geographical species only. I encountered the chief difficulty in the second section with the filaments equally narrowed or slightly dilated downwards. Here *G. singuliflora*, *G. chlorosperma*, and *G. macrophylla* appear to me distinct beyond any doubt; but it is the group of forms under the names of *G. trifoliata*, *G. triphylla*, and *G. puberula* which I have been unable to unravel properly on account of the meagre and incomplete material at my disposal. I am strongly in favour of uniting them all into one species, but any such step on my part would be premature, the more so as several forms of which I had only buds are provisionally incorporated in *G. trifoliata*, and these may prove distinct. *Glycosmis arborea*, Roxb., has remained a puzzle to botanists, and whether my var. *insularis* can fairly be brought together with it remains to be shown. Roxburgh's description as well as figure is clear, and there can be little doubt that the species will finally be refound in the Circars. My variety of it has the largest flowers of all the genus, and when the tree is in bloom it presents quite a showy aspect in the jungles. Further inquiry and better knowledge of the *trifoliata* section may, however, reduce this species. For the present I must content myself with giving the result of my own researches, and leave the further elucidation of the doubtful species indicated to those who are in the possession of better material than I have at my command.

Conspectus of the Species.

* Filaments gradually dilated upwards, and abruptly acuminate below the anthers.

† Berries obovate to oboval, leaden-blue.

Anthers obtuse; ovary smooth . . . . *G. cyanea.*

†† Berries globular or nearly so, watery-white to flesh-coloured and crimson.

Bark red-brown, fissured; petals very deciduous; anthers minutely gland-tipped . . . . *G. lanceolata.*

Bark white; petals more persistent; anthers conspicuously gland-tipped . . . . *G. pentaphylla.*

** Filaments subulate or linear, gradually and slightly or not dilated downwards.

† Flowers solitary in the leaf-axils.

Berries oblong, ½ in. long; leaflets coriaceous, polished above . . . . . *G. singuliflora.*

†† Flowers in cymes, panicles, or simple or compound racemes.

‡ Nerves and midrib above not impressed.

§ Petals obovate to obоval, broad.

Petals very deciduous; anthers obtuse; leaflets usually large . . . . . . *G. trifoliata.*

Petals more persistent; anthers obtuse; leaflets small . . . . *G. triphylla.*

Petals very deciduous; anthers gland-tipped; filaments short, equally filiform; ovary sessile, densely rusty-pilose . . . . . *G. puberula.*

§§ Petals very deciduous, linear-oblanceolate.

Anthers obtuse; filaments very long; ovary stipitate, papillose or rarely smooth . . . *G. arborea.*

‡‡ Nerves and midrib above conspicuously impressed.

Leaflets greenish-grey; berries the size of a cherry . . . . *G. chlorosperma.*

1. *G. cyanocarpa*, Spreng. Syst. Veg. iv., 2, 161 (1827); Miq. Fl. Ind. Bat. i., 2, 521.—(*Cookia cyanocarpa*, Bl. Bydr., 136; *G arborea*, Wall. Cat. 6373 D.; *G. pentaphylla*, Wall. Cat. 6374 G., p.p.)—Frutex in arbusculum 8-15 pedalem excrescens, ramulis pallidis gemmis vulgo fulvo-pilosis; folia quam maxime variabilia, imparipinnata ad unifoliolata, glabra; foliola 5-3-1, oblongo-lanceolata ad lanceolata, basi acuta v. acuminata, breviter petiolata, integra, acuminata usque ad obtuse et longe caudata, chartacea, glabra, 3-8 poll. longa v. (in simplicibus) usque 1 ped. longa; flores parvinsculi, brevissime pedicellati, albi, paniculas pedunculatas strictas v. cymas glabras v. fulvo-pilosulas axillares et terminales formantes; calyx glaber v. parce fulvo-pilosus, lobis lato-ovatis acutis; petala obovato-oblonga, longius persistentes, 2 lin. circiter longa; filamenta sursum sensim dilatata et sub anthera eglandulosa abrupte acuminata; antherarum loculi paralleli; ovarium fusiforme cum stigmate obtuso continuum 5-loculare; baccæ obovatæ, apiculatæ, impresso-punctatæ, plumbeo-cyaneæ, vulgo 2-spermæ, semina semiconcava, oblonga, pallide venosa.

Var. *α. genuina*, folia texturæ tenuioris, majora, impari-pinnata; paniculæ brachiatæ, longius pedunculatæ, terminales et axillares, petiolo multo longiores, ovarium 5-perraro 4-loculare.

Var. *β. sapindoides* (*G. sapindoides*, Lindl. in Wall. Cat. 6376; H.f. Ind. Fl. i., 501; *G. macrophylla*, Wall. Cat. 6377 A. p.p.), folia formæ genuinæ sed pallidiora; paniculæ a basi ramosæ, petiolo vulgo breviores, semper (?) axillares, ovarium 2- v. interdum 3- loculare.

Var. *γ. cymosa* (*G. oxyphylla*, Wall. in Voigt Cat. Hort. Calc., 1845, 129; *G. tetraphylla*, Wall., l.c.; *G. lucida*, Wall. MS.; *G. pen-*

taphylla, subvar. 4, Oliv. & H.f. Ind. Fl. i., 500?; *G. pentaphylla,* Wall. Cat. 6374 F.), folia minora, foliola subcoriacea, nitida, vulgo pallida; paniculæ ad cymas dichotomo-ramosas breviter pedunculatas v. subsessiles redactæ, axillares, glaberrimæ v. fulvo-pilosulæ, petiolo vulgo breviores, ovarium vulgo 5-loculare.

? Var. δ. *simplicifolia* (*G. pentaphylla,* subvar 1. *longifolia,* Oliv. & H.f. Ind. Fl. i., 500?), folia vulgo simplicia et multo majora sæpius usque ad pedem longa, subtus nonnunquam subargenteo-pallida cymæ parvæ, breviter pedunculatæ v. sæpius sessiles et a basi ramosæ, fulvo-pilosæ axillares et terminales; flores minores, ovarium 5-loculare.

Hab.—Var. α. Indian Archipelago, from Java northwards to Penang; var. β., Penang; var. γ., common in tropical forests from Assam and the Sikkim Himalaya to Burmah and Tenasserim (Hb. Griff, no. 523, 523, 1, and 526, 3, also greater part of "G. arborea," distributed from Kew Herb.); var. δ, Khasya Hills and Pegu, in dense tropical forests, ascends up to 4000 feet elevation.

This species has a wide range, and the cymose-flowered, smaller-leaved Sikkim form differs greatly in aspect from the genuine Malay form; but Khasya specimens connect it in a wonderful way, for here the cymes change often into terminal and axillary peduncled panicles. Var. γ. must remain for the present doubtful, for I have in most cases only young very rusty tomentose inflorescences before me.

2. *G. lanceolata,* Spreng., ap. T. et B. Cat. Hort. Bog., 1866, 208. —(*Sclerostylis lanceolata,* Bl. Bydr. 134; *G. simplicifolia,* Spreng. Syst. Veg. iv., 2, 162, Miq. Fl. Ind. Bat. i., 2, 521; *G. pentaphylla,* Miq. Fl. Ind. Bat. i., 2, 522, et auct. Batav., non Anglic., Spreng. Syst. Veg. iv., 2, 161?; *G. virgata,* T. et B. MS.; *G. microcarpa,* T. et B. MS.; *G. latifolia,* T. et. B. MS.; *G. macrophylla,* Miq. Fl. Ind. Bat. i., 2, 522?; *Sclerostylis macrophylla,* Bl. Bydr. 135?; *G. obtusa,* Miq. in Ann. Mus. Lugd.-Bat. i., 211?; *Sclerostylis Timoriensis,* Roem. Syn. fasc. i., 43.—Frutex usque 10 pedalis, glaber, gemmis rufo- v. fulvo- tomentellis, ramulis brunneis v. rufo-brunneis; folia impari-pinnata v. sæpius simplicia; foliola v. folia simplicia lanceolata ad oblongo-lanceolata et elliptica, breviter petiolulata, obtusa ad obtuse acuminata et emarginata, basi acuta acuminata v. obtusa, 3-5 poll. longa, fuscescenti-viridia, chartacea v. subcoriacea, integra, supra nitida; flores parvi, albidi, brevissime pedicellati, cymas parvas v. paniculas pedunculatas v. a basi ramosas axillares et terminales vulgo fulvo-pilosas formantes; calyx lato-ovatus, vulgo fulvo-pilosus; petala 1 lin. longa v. longiora, obovalia, obtusa, mox decidua; ovarium cum toro crasso conspicue papillosum, glabrum v. parce fulvo-pilosum, cum stylo crasso continuum, 2-3 loculare; filamenta sursum sensim dilatata et sub anthera abrupte acuminata; antheræ cordato-oblongæ, glandula parva terminatæ v. apiculatæ, loculis passim glanduloso-punctatis; baccæ globosæ, pisi minoris v. majoris magnitudine, coccineæ, nitidæ, 1-2-spermæ.

Hab.—Common all over Java, also Timor, Sumatra, Banca, Borneo (Motley, 271).

This takes the place of *G. pentaphylla* in the Malay Archipelago, and is easily enough distinguished from it by the brown or red-brown bark.

3. *G. pentaphylla*, Correa in Ann. Mus. vi., 384 ? ; W. & A. Prod. i., 93 ; DC. Prod. i., 538 ? ; Bedd. Fl. Sylv. Madr. Anal. 43, t. 6, f. 6 ; Thw. Ceyl. Pl. 45.—(*Limonia pentaphylla*, Retz Obs. Bot. v., 24 ?, Roxb. Corom. Pl. i., t. 84, & Fl. Ind. ii., 381 ? ; *G. arborea*, Thw. Ceyl. Pl. 45, Bot. Mag., t. 2074 ? ; *G. pentaphylla*, var. 1, Oliv. & H.f. Ind. Fl. i., 500 ; *G. Retzii*, Roem. Syn. fasc. 1, 41 ?)—Frutex in arbusculum 10-15 pedalem excrescens, vulgo 2-5 ped. altus, glaber v. sæpius gemmis et novellis parce fulvo-pilosis, cortice albo ; folia more specierum aliarum variabilia, impari-pinnata ad simplicia, glabra ; foliola 5-1, elliptico- ad lanceolata- oblonga et lanceolata, brevissime petiolulata, basi vulgo acuta, obtusa, apiculata ad obtuse-acuminata, integra v. sursum serrulata, chartacea, 2-6 poll. longa, glaucescenti-pallida et vulgo subopaca ; flores parviusculi, brevissime pedicellati, albi, paniculas pedunculatas axillares et terminales glabras v. fulvo-pilosas vulgo petiolo multo longiores formantes, raro paniculæ parvæ et compactæ ; calyx glaber v. fulvo-pilosulus, lobis lato-ovatis acutis ; petala lato-obovata, longius persistentia ; filamenta sursum sensim dilatata et sub anthera abrupte acuminata, plana, supra concaviuscula ; antheræ cordato-ovatæ, glandula conspicua lutescente (in sicco nigra) terminatæ ; ovarium 5-raro 4-3-loculare, sessile, conicum et cum stylo continuum, stigmate disciformi crasso terminatum, grosse papillosum ; baccæ globosæ, pisi magnitudine, aquose albæ v. carneæ, 1-2-spermæ, succosæ, nitidæ.

Hab.—Common all over and restricted to India, from the base of the whole Himalaya down to Hindostan as far as Ceylon, and Burmah as far south as Tavoy. In village woods of the alluvial plains it remains a small shrub, while on rocky soil and in the shade of forests it grows to be a small tree.

This is a well-marked form, which once recognised cannot easily be confounded with the other species. But in Assam and in Burmah, where it comes in contact with *G. cyanocarpa*, the texture of the leaves often approaches that of the cymose form of the latter form, and it is then not easy to separate them in herbaria without having the flowers or fruits at hand.

4. *G. trifoliata*, Spreng. Syst. Veg. iv., 2, 162; Miq. Fl. Ind. Bat. i., 521.—(*Sclerostylis trifoliata*, Bl. Bydr. 134 ; *G. pentaphylla*, Bth. Fl. Austr. i., 368 ?; *G. virgata*, T. et B. MS.)—Frutex usque 8 pedalis, ramulis pallidis, gemmis sæpius ferrugineo-tomentosis ; folia pinnatim 5-3- v. passim 2-1- foliolata, glabra ; foliola elliptico-oblonga ad oblongo-lanceolata et lanceolata, breviter petiolulata, obtusa v. apiculata ad obtuse-acuminata, 2-4 poll. longa, chartacea v. tenuicoriacea, integra, supra magis minusve nitida v. sub-opaca ; flores parvi, albi, brevissime pedicellati, racemos v. paniculas ferrugineo-tomentosos axillares v. passim etiam terminales efficientes ; calyx rufo-tomentellus, glabrescens, lobis rotundatis ; petala valde decidua, in alabastro extus rufo-pilosa ; filamenta (ex alabastris sumpta) e basi latiore sursum sensim attenuata ; antheræ cordatæ, eglandulosæ ; ovarium ovoideum, basi constrictum, in stylum tenuiusculum attenuatum, fugaciter rufo-pilosum, 3-loculare ; baccæ globosæ, pisi minoris magnitudine, punctatæ.

Var. *α. genuina*, cf. descriptionem speciei, sed flores in racemos breves axillares dispositi.

Var. β. *angustifolia* (*G. angustifolia*, T. et B. Cat. Bog., 1866, 208), foliola minora, lanceolata, nitida; flores minores, in paniculas parvas axillares et subterminales breves graciles dispositi; ovarium papillosum, stylus crassior.

? Var. γ. *latifolia*, folia 3-1-foliolata, foliola latiora, paniculæ robustiores, parvæ, axillares; ovarium 5-loculare?, læve v. papillosum.

? Var. δ. *fuscescens*, folia vulgo pinnato-3-foliolata, foliola nitida, in sicco semper fuscescentia; paniculæ parvæ v. in forma Assamica, magnæ et valde ramosæ, glabræ; alabastra valde juvenilia tantum cognita.

Hab.—Var. α., Java, Australia, Queensland?; var. β., Sunda Straits; var. γ., Andamans, in the tropical forests (also Helfer, 525 & 525, 1), ? Ceylon (T. Thomson sub nom. *G. arborea*); var. δ., frequent in the tropical forests of the Andamans and the Nicobars; also Khasi hills.

The present species may turn out to consist of heterogeneous forms, but I am unable to place them properly, on account of the very meagre material at my disposal; besides, I could not examine the male organs from opened flowers, and finally, of the Indian forms (vars. γ. and δ.) I have seen either only buds or not well-developed ovaria.

Bentham's Australian *G. pentaphylla* quite agrees in its habit, &c., with the form called by Teysman and Binnendyck *G. virgata*, but the ovary is stated to be 5-4-celled. I have seen only the panicles without anything left on them.

5. *G. triphylla*, Wight in Hook. Bot. Misc. iii., 298; Suppl. t. 39, & Icon., t. 167; W. & A. Prod. i., 93.—(*G. nitida*, W. & A. Prod. i., 93.)—Frutex, novellis ferrugineo-tomentosis; folia pinnatim 3-4-, rarius 5- v. 1- foliolata, glabra; foliola inter minora, elliptico-oblonga ad ovata et ovato-lanceolata, obtusa v. breviter obtuse-acuminata, brevissime petiolulata, 1-3 poll. longa, integra, coriacea, nitida v. opaca; flores parviusculi, 5-rarius 4-meri, albi, brevissime pedicellati, paniculas breves sæpius in cymas contractas rufo- v. ferrugineo-tomentosas v. rarius subglabras axillares et terminales formantes; calyx ferrugineo-tomentellus, lobis latis rotundatis v. acutiusculis; petala longius persistentes, obovato-lanceolata, 2 lin. longa; filamenta e basi parum latiore subulata, plana; antheræ cordato-oblongæ, eglandulosæ; ovarium 5-4-loculare, ovoideo-oblongum, basi constrictum, stigmate obtuso; baccæ . . .

Var. α. *genuina*, foliola latiora, uti supra descripta.

Var. β. *angustifolia* (*G. angustifolia*, Ldl. in Wall. Cat. 6378; W. & A. Prod. i., 93), foliola lanceolata v. lineari-lanceolata, 1½-3 poll. longa, 4-8 lin. lata.

Hab.—Apparently restricted to Hindostan (Wight Herb. 365 & 366; Wall. Cat. 6374 A.); Ceylon, 4500 feet (T. Thomson).

Future inquiries must show whether this species may not be a geographical form of *G. trifoliata*, but the unsatisfactory state of our knowledge of this latter species and its true distribution allows not even a guess in this direction. The persistent petals seem to be a good mark.

6. G. singuliflora, nov. sp. Arbuscula?, gemmis ferrugineo-villosis, ramulis pallidis; folia iis *G. angustifoliæ*, Lindl. similia, pinnatim

5-3-foliolata; foliola subsessilia v. breviter petiolulata, lanceolata, longius v. brevius obtuse-acuminata, integra, basi acuminata, coriacea, supra polita; flores . . . in axillis foliorum solitarii, pedunculum brevissimum crassum ferrugineo-villosum terminantes; calyx ferrugineo-pilosus, lobis ovatis, acutis; baccæ oblongæ, læves, purpureæ?, 6-7 lin. longæ, monospermæ.

HAB.—Upper Assam, on the banks of the Brahmakoond (Masters). Fr. Febr.

A very distinct species, which I insert in this place solely on account of its great resemblance to *G. angustifolia*, Lindl.

7. *G. puberula*, Lindl. in Wall. Cat. 6375; Oliv. in Proc. Linn. Soc. v., Suppl. ii., 39; H.f. Ind. Fl. i., 501.—Frutex, gemmis fulvo-tomentosis, ramulis pallidis; folia vulgo pinnatim 3-rarius 4-foliolata; foliola lanceolata ad oblongo-lanceolata, basi cuneato-acuminata, breviter petiolulata, longius v. brevius obtuse-caudata, chartacea, 2-4 poll. longa, integra, glabra, supra nitentia; flores . . . brevissime pedicellati, paniculas breves ferrugineo-tomentosas axillares et terminales formantes; calyx ferrugineo-pilosulus, glabrescens, lobis lato-ovatis acutis; petala . . . valde decidua; filamenta (ex alabastro juniore sumpta) linearia; antheræ cordato-oblongæ, apiculatæ; ovarium conico-ovoideum, basi vix constrictum, 5-4-loculare, dense ferrugineo-pilosum, stigmate obtuso.

HAB.—Penang and Singapore (Wall.).

This species is very nearly allied to *G. trifoliata*, and I have kept it up for two reasons—first, because the material before me is incomplete; and, secondly, the equally linear filaments and gland-tipped anthers may afford a better distinction when taken from open flowers, whereas mine came from a very young bud.

8. *G. arborea*, Corr. in Ann. Mus. vi., 384; W. & A. Prod. i., 92. (*Limonia arborea*, Roxb. Corom. Pl. i., 60, t. 85., & Fl. Ind. ii., 381.)—Arborea, ramulis brunnescentibus; folia pinnatim 5-foliolata; foliola oblonga, poll. longa, breviter petiolata, sursum serrata, glabra; flores parvi, albi, brevissime pedicellata, paniculas pedunculatas magnas axillares formantes; calyx 5-dentatus?; petala longius persistentes?, lineari-obovata, lin. circiter longa, reflexa; filamenta filiformia, elongata; antheræ cordatæ, obtusæ; ovarium conico-lagenæforme, toro crasso insidens, stigmate obtuso truncato; baccæ globosæ, pisi minoris magnitudine, 1-2-spermæ, rubræ.

Var. *α. genuina*, foliola serrata; ovarium in toro crasso sessile; calyx dentatus?; paniculæ pedunculatæ.

Var. *β. insularis*, foliola integra; ovarium stipitatum; calyx dentatus; paniculæ breves, sessiles v. breviter pedunculata, ferrugineo-tomentosæ.

Arbor 20-25 pedalis, gemmis ferrugineo-villosis, ramulis brunnescentibus; folia pinnatim 5-3-foliolata, glabra; foliola elliptica ad elliptico- et ovato- oblonga, basi acuminata, breviter petiolulata, obtuse-acuminata, 4-6 poll. longa, integra, chartacea, supra nitida v. opaca; flores majusculi, albi, brevissime pedicellati, in paniculas contractas breves fuligineo- v. ferrugineo- tomentosas axillares et terminales disgesti; calyx breviter subcampanulatus, 5-dentatus; petala lineari-oblanceolata, 2½ lin. longa, valde decidua; filamenta filiformia, ovario longiora; antheræ cordato-ovales, eglandulosæ; ovarium fusiforme, stipitatum, nunc læve et pilosum et in gracilem stylum, nunc papillosum et in stylum crassum truncatum attenuatum, 5-loculare; baccæ globosæ, pisi magnitudine, 1-2-spermæ, coccineæ, nitidæ.

HAB.—Var. *α.*, Circar Mountains; var. *β.*, frequent in tropical forests of the Andamans and the Nicobars, ? Chittagong (H.f. & Th. sub nom. *G. arborea*), ? Ceylon (Thw. 1192, p.p.).

It is rather hazardous to identify a more Malayan form with Roxburgh's plant, but I can find nothing that could agree better with Roxburgh's figure and description. The ovary, however, and the serrate leaves of the Circar plant form a serious obstacle, and I have, therefore, drawn up a separate description of the insular form. If we attach not much value to the form of the ovary, the persistency of the petals, the anther-glands, and slight dilatations of the filaments, we might bring *G. trifoliata*, *triphylla*, *puberula* and this species all under one, call it very variable, and give it as wide a range as possible; but I fear that little would be gained from such a proceeding.

9. *G. chlorosperma*, Spreng. Syst. Veg. iv., 2, 162; Miq. Fl. Ind. Bat. i., 2, 522.—(*Cookia chlorosperma*, Bl. Bydr., 135.)—Frutex 4-6 pedalis, novellis ferrugineo-tomentosis, ramulis pallide brunneis; folia vulgo pinnatim 4-3- rarius 7-5- foliolata, glabra; foliola elliptico- ad ovato- oblonga, breviter petiolulata, basi acuminata et sæpius subinequalia, subabrupte obtuse-acuminata, 4-7 poll. longa, chartacea, intégra, in sicco cinerascentia et opaca, costa et nervis lateralibus supra impressis; stipulæ conspicuæ, persistentes, 2-3 lin. longæ, subulatæ, fulvo-tomentellæ; paniculæ robustæ, fulvo- v. ferrugineo-tomentellæ, subsessiles v. longe pedunculatæ, in axillis folii terminali sitæ v. rarius axillares; flores . . ., subsessiles, glomerulati; "calyx parvus, 5-phyllus; petala 5, elliptica, erecto-patentia; stamina plerumque 9, filamenta lineari-subulata, compressa; antheræ cordatæ; ovarium basi tumidum, 5-loculare; stylus subnullus, stigmate obtuso" (ex cl. Blume); baccæ globosæ, cerasi minoris magnitudine, exsucca stigmate sessili obtuso terminatæ, 1-3-spermæ, læves.

HAB.—In the hill forests of Western Java.

This species is as yet incompletely known, but a very distinct one on account of the conspicuous persistent stipules and the impressed midrib and nerves.

10. *G. macrophylla*, Lindl. in Wall. Cat. 6377.—(*G. pentaphylla*, subvar. 2, *macrophylla*, Oliv. & H.f. Ind. Fl. i., 500.)—Fruticosa, glabra; folia opposita v. subopposita, v. summa passim alterna, pinnatim 7-5- raro 1- foliolata, glabra; foliolola oblongo-lanceolata ad lanceolata, basi acuta v. acuminata, longiuscule petiolulata, 3-6, in simplicibus 6-9 poll. longa, obtuse-acuminata, integra, chartacea, imprimis supra nitida; stipulæ subulatæ, longius persistentes, 1-1½ lin. longæ, glabræ, et paraphyllis stipuliformibus associatæ; paraphylla ab petioli insertione paullo remota, lineari-lanceolata ad linearia, obtuse-acuminata, basi in petiolum brevem abeuntia, ⅔-1½ poll. longa; paniculæ pedunculatæ, parvæ, rigidæ, subglabræ, terminales et basi paraphyllis 4 quasi involucratæ; flores subsessiles, ignoti; calycis lobi ovales, subglabri; ovarium ovoideum, toro crasso insidens, stylo brevi robusto truncato.

HAB.—Penang (Wall. Cat. 6377; Maingay, no. 282).—According to Hook. f., also in Assam and Tavoy.

A very peculiar form on account of the paraphylla and the opposite leaves, in general habit resembling *G. sapindoides*. In the simple-leaved form the paraphylla seem absent, at least in the only specimen before me (not a good one) they are so. Hooker identifies with the above *Chionotria rigida*, Jack, Mal. Misc. ex Hook. Comp. Bot. Mag. i., 155 (*Ch. monogyna*, Walp. Rep. i., 382; Roem. Syn., fasc. 1, 73), and there are really many points that agree; but in this case the species would turn out to be a very marked one, for the calyx is said to be very small, and "the petals little longer than the calyx," the berries the size of a cherry, snow-white, consisting of "spongy farinaceous pulp."

Species dubiæ.

1. *G. citrifolia*, Lindl. in Trans. Hort. Soc. Lond. vi., 72; Bth. Fl. Hongk., 51.—(*G. parviflora*, Bot. Mag., t. 2416; *Limonia citrifolia*, Willd. Enum. 4481?, DC. Prod. i., 536?; *G. heterophylla*, A. Rich. in Sagr. Hist. Cuba, Bot. i., 231?.)

HAB.—China.

Of this species I know nothing, and the figure in the "Botanical Magazine" is worthless at the present time. Oliver reduces it to his var. *chinensis* of *G. pentaphylla*.

2. *G. bilocularis*, Thw. Ceyl. Pl., 45; Oliv. & H.f. Ind. Fl. i., 500.

HAB.—Ceylon, Maturatte district.

It seems that much too much stress has been laid upon the 2-celled ovary. The filaments are described as "multum et irregulariter dilatata, interne concava." It probably will turn out a synonym of one of the species adopted above. I have seen no specimens.

3. *G. chylocarpa*, W. & A. Prodr. i., 93.—(*Myxospermum chylocarpum*, Roem. Syn., fasc. i., 40.)

HAB.—Hindostan.

4. *G. macrocarpa*, Wight Ill. i., 109.—(*G. pentaphylla*, var. 3, *macrocarpa*, H.f. Ind. Fl. i., 500.)

HAB.—Courtallum (Wight).

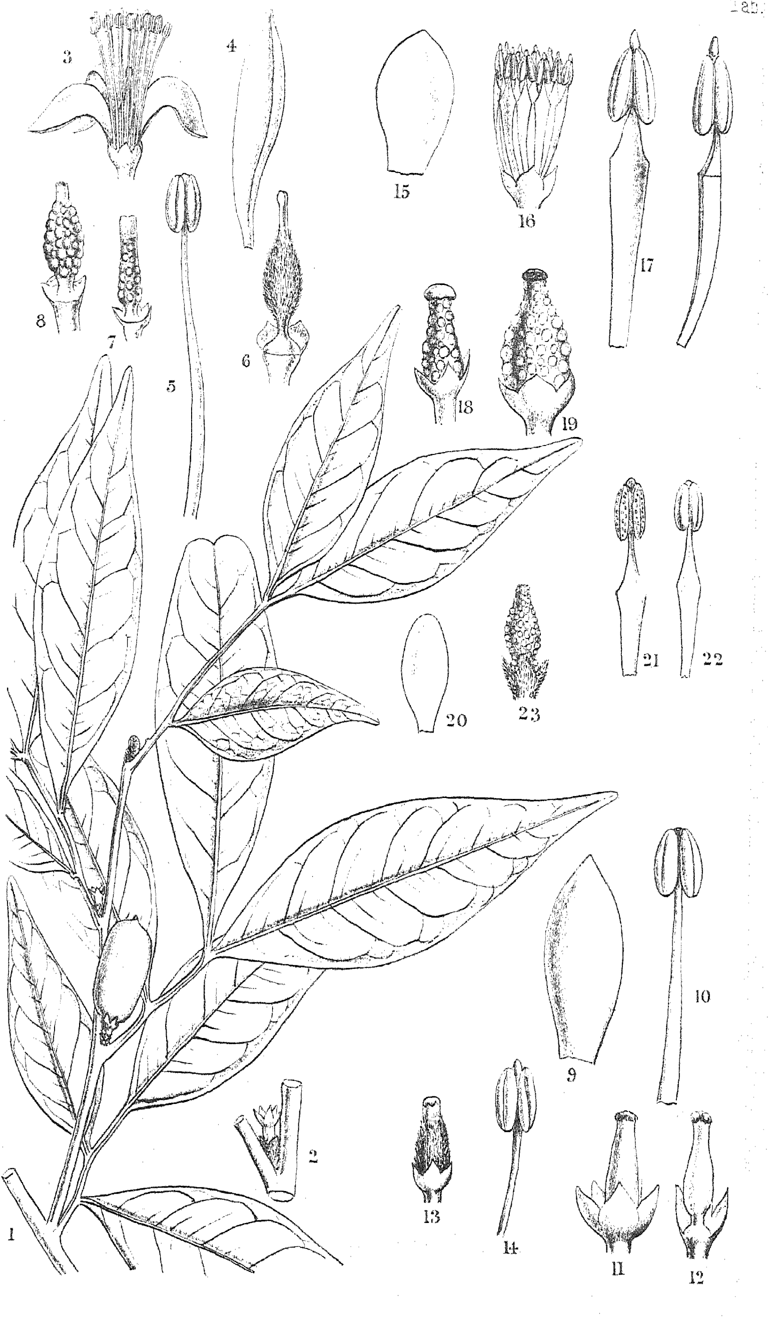
This species is unknown to me, but the large fruits (¾-1 in. thick) alone would prevent me from making a variety of *G. pentaphylla*.

EXPLANATION OF TABS. 174, 175.

Tab. 174.—Fig. 1—2, *Glycosmis singuliflora*, Kz.; fig. 3—8, *Glycosmis arborea*, var. *insularis*; fig. 9—12, *Glycosmis triphylla*, Wight; fig. 13—14, *Glycosmis puberula*, Wight; fig. 15—19, *Glycosmis pentaphylla*, Corr.; fig. 20—23, *Glycosmis lanceolata*, Spreng. Fig. 1 natural size, the rest all more or less magnified. Explanation of figures themselves unnecessary. (Ovary fig. 6 and 7 came from flowers off the same tree, thus verifying Hasskarl's observation (Cat. Bog. ed. alt.): "Ovarium et bacca 1-5-loculata, loculis 1-spermis, in eodem ramo maxime variabilis.")

Tab. 175. *Glycosmis cyanocarpa*, Spreng.—Fig. 1—4, forma genuina; fig. 5—7, forma cymosa. Fig. 1, Flowering and fruiting branch, nat. size; fig. 2, Ovary; fig. 3, Petal; fig. 4, Stamen; fig. 5, Flowering branch, nat. size; fig. 6, Ripe berries; fig. 7, Seeds, back and side view.

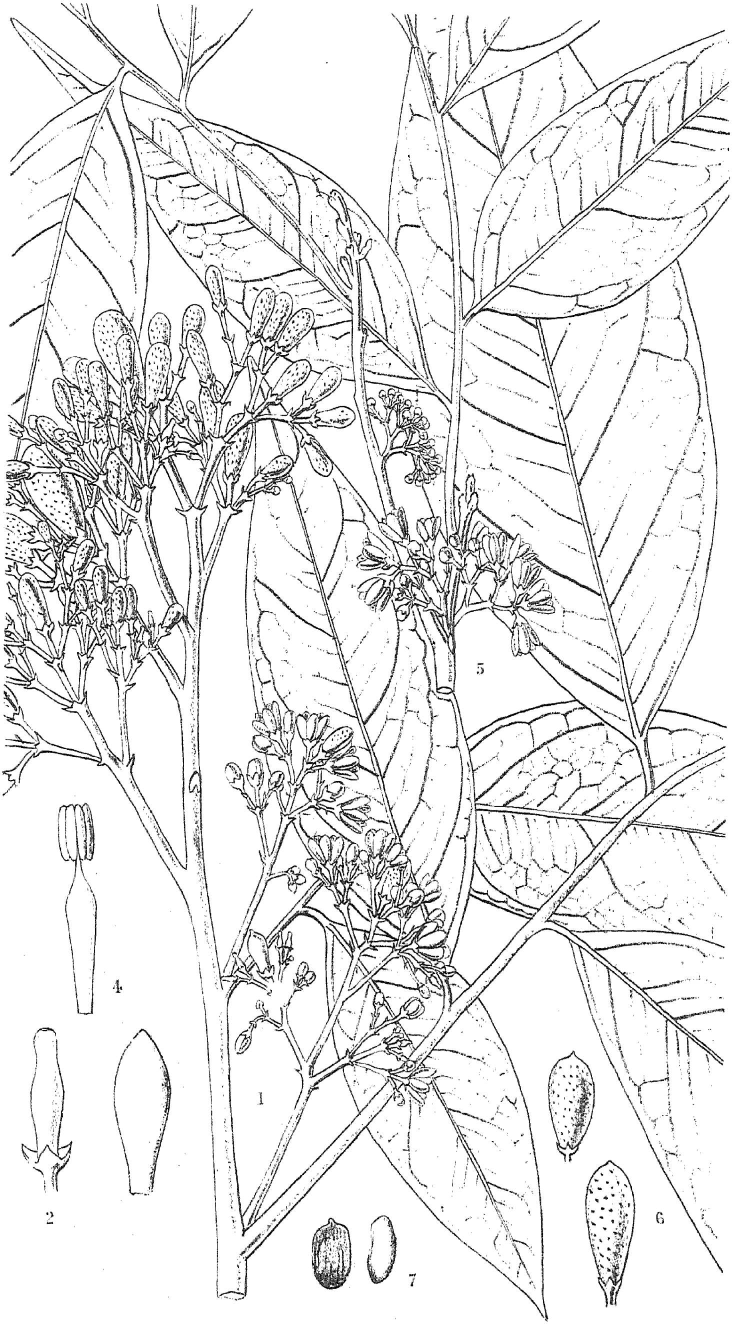
Tab.



D Blair, Lith.

Glycosmis

Tab. 175.



D. Blair lith.

Maclure & Macdonald lith. London

A LIST OF PLANTS COLLECTED IN SPITZBERGEN IN THE SUMMER OF 1873, WITH THEIR LOCALITIES.

By the Rev. A. E. Eaton, M.A.*

In the summer of 1873 (June to September inclusive) a collection of animals and plants was made in Spitzbergen during the third cruise to the Greenland Sea of B. Leigh Smith, Kt. of the Order of the Polar Star. Amongst the plants were several species of interest, some being previously unknown as natives of that country, and others new to science. The Phanerogams and higher Cryptogams were worked out by Mr. Le Marchant Moore; Dr. Dickie determined the Algæ, with the exception of the Diatoms, which were investigated by the Rev. E. O'Meara, whose descriptions of the new species were published in the "Quarterly Journal of Microscopical Science" (1874, pp. 254-261, tab. 8.) Amongst the Lichens and Mosses there was nothing worthy of particular notice.

Approximate conception of the general aspect of the country can be formed by persons acquainted with alpine scenery. West Spitzbergen is more mountainous and rugged than North-East Land; but its snow-fields and glaciers are less extensive than those of the latter. From the hills near King's Bay views of the surrounding highlands are commanded similar in character to those obtained in the higher regions of the Swiss Alps on a reduced scale. But looking eastward from the southern portion of Hinlopen Straits, the ground, slightly undulating, is seen to rise gradually upward from the sea in a succession of smooth slopes extending as far as the eye can follow them towards the interior of the island, with scarcely a break in the even contour of their snow-clad surface. Towards Cape Leigh Smith and its northern coast, however, North-East Land is hilly and mountainous. The land adjacent to the western and northern shores of the islands is usually free from snow in the height of summer.

The ground itself is in most places destitute of soil; where there is any it is generally sandy. The surface consists principally of broken rocks mixed with smaller stones, amongst which (especially where banks are formed) patches of such plants as are characteristic of the various altitudes struggle for existence. The most abundant species grow on the lowlands bordering upon the shore. The rarities are chiefly found farther from the sea. The upper parts of the débris accumulated at the base of the precipitous sides of some of the valleys afford suitable soil for delicate plants.

The localities cited in the list are given in modern charts. Where Wide Bay is specified, its eastern shore is to be understood to be alluded to. The few species new to the flora are distinguished by the prefix of an asterisk.

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* It may seem somewhat of a repetition to publish the following list, as the flora of Spitzbergen is so well known, and a complete catalogue of the Phanerogams has been printed in our pages (Journ. Bot., 1864, pp. 130, 162, and 1874, p. 152). But the present contains a few novelties, and the localities are for the most part different to those given in Malmgren's and the other lists.—[*Ed. Journ. Bot.*]

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The localities cited in the list are given in modern charts. Where Wide Bay is specified, its eastern shore is to be understood to be alluded to. The few species new to the flora are distinguished by the prefix of an asterisk.

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* It may seem somewhat of a repetition to publish the following list, as the flora of Spitzbergen is so well known, and a complete catalogue of the Phanerogams has been printed in our pages (Journ. Bot., 1864, pp. 130, 162, and 1874, p. 152). But the present contains a few novelties, and the localities are for the most part different to those given in Malmgren's and the other lists.—[*Ed. Journ. Bot.*]

Ranunculus sulphureus, *Sol.* Walden Id., Lomme Bay, Hecla Cove, Wide Bay, Hope Id.
*acris, *L.* Wide Bay, in cliffs near a glacier.
pygmæus, *Wahl.* Wide Bay.
hyperboreus, *Rottb.* Wide Bay.
lapponicus, *L.* Wide Bay.
Papaver nudicaule, *L.* Cape Oetker, Hecla Cove, Wide Bay (some with sulphur-coloured petals), Hope Id.
Cardamine pratensis, *L.* Green Harbour.
Cochlearia fenestrata, *R.Br.* Walden Id., Wide Bay. Some specimens in June, scarcely exposed by the melting of the snow, were in flower. Their inflorescence was very dense, subcorymbose, and subsessile. The same plants were almost leafless.
Draba hirta, *L.* Wide Bay. "The several forms in the collection vary in height from 1½ inch to 5 inches."—Moore. The tallest specimens grew amongst the cliffs near a glacier, on the east side of the eastern fork of the inlet, slightly higher up than the furcation.
alpina, *L.* Lomme Bay, Hecla Cove, Wide Bay, Hope Id.
Wahlenbergii, *Hartm.* Wide Bay, near Aldert Dirke's Lakes.
rupestris, *R.Br.* Lomme Bay, Hecla Cove. "A dwarf form."—Moore.
sp. dub. Wide Bay.
Braya purpurascens, *R.Br.* Wide Bay. On sandy micaceous soil in a valley.
Lychnis apetala, *L.* Wide Bay.
Alsine rubella, *Wahl.* Lomme Bay, Wide Bay.
biflora, *L.* Wide Bay.
Stellaria longipes?, var. *Goldie.* Wide Bay. "A plant with shorter and broader leaves than the normal *S. longipes*; perhaps a distinct species."—Moore. In cliffs with *D. hirta.*
Cerastium alpinum, *L.* Lomme Bay, Wide Bay.
var. lanatum. Walden Id.
Dryas octopetala, *L.* Lomme Bay, Hecla Cove, Wide Bay, King's Bay.
Potentilla emarginata, *Pursh.* Wide Bay, Hope Id.
pulchella, *R.Br.* Wide Bay.
nivea, *L.* Wide Bay.
Saxifraga flagellaris, *R.Br.* Hecla Cove, Wide Bay, Lomme Bay. A very few specimens had two flowers at the summit of the peduncle instead of one only.
Hirculus, *L.* Hecla Cove, Lomme Bay.
aizoides, *L.* Wide Bay.
cæspitosa, *L.*, S. grœnlandica, *R.Br.* Cape Oetker, Hecla Cove, Wide Bay, Hope Id. "The Hope Id. specimen is a dwarf not ¼ inch high; those from Wide Bay have luxuriant shoots rising 6 inches above the ground."—Moore. These last-

mentioned plants grew amongst the broken rocks at the base of a cliff in the valley.

Saxifraga cernua, *L.* Wide Bay, Hope Id.

nivalis, *L.* Lomme Bay, Wide Bay, Hope Id.

oppositifolia, *L.* King's Bay, Wide Bay, Hecla Cove, Cape Oetker.

Taraxacum phymatocarpum, *Vahl.* Hecla Cove, Wide Bay. Scarce on the low ground by the sea, but common in the cliffs of the valleys.

Petasites frigida, *Fr.* In Ice Fiord near the entrance of Green Harbour (S. side).

Erigeron uniflorus, *L.* Hecla Cave, Wide Bay.

Arnica alpina, *L.* Wide Bay. In cliffs near a glacier.

Campanula uniflora, *L.* Wide Bay. On the cliffs of valleys.

Andromeda tetragona, *L.* Lomme Bay, Wide Bay. On hills, common.

Gentiana * tenella, *Fries.* Wide Bay, at the base of a cliff in a valley. Very local.

Pedicularis hirsuta, *L.* Wide Bay.

Polygonum viviparum, *L.* Wide Bay.

Oxyria reniformis, *Hook.* Cape Oetker, Hecla Cove, Wide Bay.

Salix polaris, *Vahl.* North Cape Id., Cape Oetker, Lomme Bay, Hecla Cove, Wide Bay, King's Bay. Abundant. The autumnal tints of its leaves, the plant growing in patches almost even with the surface, contrast strangely with the soil.

Juncus biglumis, *L.* In Wide Bay, near Aldert Dirke's Lakes.

Luzula arcuata, *Wahl.* Hecla Cove, Wide Bay, Hope Id.

hyperborea, *R.Br.* Wide Bay.

Eriophorum capitatum, *Hort.* Wide Bay.

angustifolium, *Roth.* Wide Bay.

Carex dioica, *L.*, *var.* parallela. Wide Bay.

nardina, *Fries.* Lomme Bay.

misandra, *R.Br.*, C. fuliginosa, *Fries.* Hecla Cove, Wide Bay.

Hierochloe pauciflora, *R.Br.* Hecla Cove.

Alopecurus alpinus, *L.* Lomme Bay, Wide Bay, Hope Id.

Aira alpina, *L.* ? ? Hope Id.

Trisetum subspicatum, *Fr.* Wide Bay.

Phippsia algida, *R.Br.* Wide Bay.

Poa flexuosa, *Wahl.*, P. laxa, *Hænke*, P. cenisea, *All.*, P. arctica, *R.Br.* Wide Bay, Hope Id. "The various forms in the collection include the vars. *abbreviata* and *prolifera.*"

Glyceria * maritima, *Walh.*, *var.* festuciformis, *Hartm.* ? ? Hope Id.

Festuca brevifolia, *R.Br.* Hecla Cove.

ovina, *L.* Lomme Bay, Wide Bay.

Cystopteris fragilis, *Bernh.* Wide Bay. Rather common amongst débris at the base of cliffs on the northern sides of the eastern valleys.

Lycopodium Selago, *L.* Wide Bay.

Equisetum variegatum, *L.* Wide Bay.
arvense, *L.* Wide Bay.
Jungermannia minuta, *Cr.* Treurenberg Bay, Hinlopen Straits.
Marchantia * polymorpha, *L.* Lomme Bay. Nearly a dozen barren plants, each of them about as small as a little finger-nail, were found upon a damp sandy bank on the western side of the hills projecting into the bay, facing the glacier.
Agaricus (Psolliota) arvensis, *Schæff.* Wide Bay.
sp. dub. Wide Bay.
Fucus vesiculosus, *L.* Moffen Id., Green Harbour. The Moffen Island specimens were stranded, with the stones to which they were attached, upon the inner shore of the island. At Green Harbour the plants grew upon rocks between tide-marks. This was the only place in the islands where seaweeds were found growing between the tide-marks; the ice in other parts would scour or tear them off from their points of attachment. But in this locality the plants were protected from the drift ice by a reef of rocks.
Desmarestia aculeata, *Lamk.* Fair Haven, Treurenberg Bay, Lomme Bay.
Alaria esculenta, *Grev.* Fair Haven, Hinlopen Straits.
Laminaria saccharina, *L.* Fair Haven and Hinlopen Straits.
Sphacelaria plumosa, *Lyngb.* Fair Haven.
Odonthalia dentata, *Lyngb.* Fair Haven.
Polysiphonia arctica, *J. Ag.* Norway Ids. in Fair Haven.
Delesseria sinuosa, *Lam.* Everywhere.
Rhodymenia palmata, *Ger.* Fair Haven.
Euthora cristata, *Ger.* Fair Haven.
Phyllophora interrupta, *Ger.* Fair Haven.
Ptilota serrata, *Kütz.* Fair Haven, Hinlopen Straits.
Conferva Melanogonium, *Kg.* Fair Haven and Lomme Bay. The name is usually misspelt *melagonium*.
Protococcus nivalis, *Ag.* Hope Id.

The Fair Haven specimens were brought up together when the anchor was weighed.

TWO NEW HONGKONG *ORCHIDS*.

By H. F. Hance, Ph.D., etc.

1. BOLBOPHYLLUM (*Cirrhopetalum*) DELITESCENS, *sp. nov.*—Rhizomate repente sesquilineam crasso, pseudobulbo ovato fibris circumvallato in sicco tenuiter longitudinaliter ruguloso, folio solitario ovali-oblongo obtuso basi cuneatim angustato 5-pollicari medio 1½ poll. lato scapum circiter æquante, scapis bifloris, vaginis arcte adpressis, bracteis setaceo-subulatis pedicellis duplo brevioribus, phyllo supremo cymbiformi trinervi 4 lin. longo interioribusque quadrato-oblongis ex apice truncato v. obtuso setam 1-2 linealem exserentibus lateralibus lineari-

bus acuminatis trinervibus 2½ poll. longis omnibus glaberrimis nudis labello recurvo.

In monte Victoria, Julio mense 1873. (Exsicc. n. 19111.)

The only specimen of this I have seen was obligingly given me in a dried state by the Rev. James Lamont, who received it from Mr. Ford. It seems only to have been gathered once. The materials do not admit of a fuller description than I have given, but the species appears distinct, and nearest *C. Macraei*, Lindl. I have no hesitation in following Prof. Reichenbach fil. in uniting *Cirrhopetalum* with *Bolbophyllum*.

2. Cleisostoma Fordii, *sp. nov.*—Foliis lanceolato-linearibus subtus carinatis apice subito in acumen complicatum contractis carnosis introveniis 4½ poll. longis semipollicem latis, spicis nutantibus 1½ poll. longis 10-15 floris, rachi pallida, bracteis ovatis minutis, floribus 5 lin. diametro glaberrimis arcte sessilibus, perigonii phyllis subæqualibus (interioribus parum angustioribus) oblongis obtusiusculis luteolis fasciis binis dilute lateritiis intramarginalibus notatis, labelli cymbiformis trilobi laciniis lateralibus subtruncatis erectis medio subulato-acuminatis roseo-purpureis intermedio latere utroque tumido ovato acumine subulato sursum curvato cum calcare obtuso bilineali albo-purpurascente, processu occludente carnoso erecto quadrato bilobo albo-hyalino. (Exsicc. n. 19121).

From the brief diagnosis, this appears to be very near *C. amabile*, Teijsm. & Binnend., from Mount Salak, Western Java, but it does not agree in the shape of the labellum. And, with the exception of those species which are widely spread over Southern Asia, not one of the thirty Orchids found in Hongkong occurs in Java. The scarcely-known *C. subulatum*, Bl., is also doubtless another close relative, but is described as having branching spikes, and is quite insufficiently characterised. Of the four or five-and-twenty species known, only five or six have pointed leaves. I have described the present plant from a living specimen, for which I am indebted to Mr. Charles Ford, the Superintendent of the Hongkong Public Gardens, after whom I have named it. It was found by one of his collectors somewhere in the east of the island, and has since been again gathered near Tai tam tuk.

THREE CURIOUS PLANTS.

By H. G. Reichenbach fil.

1. Balanophora Hildebrandtii.—Thalli tuberibus turbinatis concatenatis pustulis moriformibus paucilobis frequentissimis stipite a squamis imbricantibus tecto, inferioribus sæpe connatis, inflorescentia exserta, spadice fœmineo conico obtuso spadicellis polyhedricis innumeris, floribus masculis suppositis paucis, sessilibus, infimis nunc distantibus, bracteis transversis subobsoletis, sepalis triangulis (raro 3), 4, 5, nunc æqualibus, nunc valde inæqualibus, antheris numerosioribus in columnam sessilem connatis.

Near *B. polyandra*, Griff. This has the male flowers with very short stalks. I find them sometimes just sessile. It is manifestly dioicous.

Johanna I., Comoro Islands, June-August, 1875; J. M. Hildebrandt. Comm. C. Rensch, sub no. 1884.

2. Isatis Boissieriana.—Sect. nov. *Boissierianæ*: siliculis heteromorphis, inferioribus loculo corneo transverse costato ala baseos cordata, ala apicis rostriformi nunc emarginata, alis lateralibus demum evanidis obliteratisve, siliculis superioribus circa circum ubique bene alatis, multo minus costatis.

I. Boissieriana; annua, glauca, usque pedalis, nunc ramosa, foliis inferioribus cuneato oblongis acutis sinuato-dentatis, superioribus cordato sagittatis oblongis acutis nunc integerrimis, racemis multifloris, siliculis velutinis.

I obtained the seeds of this curious plant some years ago from the Moscow Botanic Garden, labelled "*Isatis*, sp. Samarkand." The first year, being absent during the very short time of flowering, I found the withered petals white. I was much struck by the abnormal seed-pods, and thought of a new genus. I sent what I could to M. Boissier, who was much astonished at the queer thing, and asked whether the flowers were really white. The plant has now flowered several times, and looks very elegant when the leaves keep very small. Its petals are light yellow. Last year I missed the plant, and the foreman in charge of it told me the seeds of 1874 had not germinated. I immediately ordered him to sow all our stock in two parts, at a week's interval, and we obtained a very rich harvest. I tell this to show how easily such a plant may be lost in botanic gardens, if the superintendent does not keep a look-out for it. I then twice sent good specimens to M. Boissier, a little suspecting that it might be an anomalous state of some known *Isatis*. Though quite overdone with his own work, M. Boissier was kind enough to compare the plant, with his usual accuracy, with his unique set of Oriental types. Finally, he told me lately it was decidedly new to his "Flora Orientalis." He wanted me to look at the numerous recent Russian publications. I had already done so, so far as I was able; but as those publications are scattered everywhere, I thought it better to address myself to Kew, asking that Mr. N. Brown might look for a new *Isatis*, or an allied supposed new genus. He has lately informed me that Professor Oliver himself, who is overburdened so much with work, had most kindly looked over all the recent Russian publications without finding a trace of it. I had expected M. Boissier would name the plant, as I had asked him to do, but he did not do so. Hence I now avail myself of the opportunity of adorning the plant with M. Boissier's name, who for thirty-two years has ever proved the same kind and obliging correspondent. I need not say that I will take care to have the plant well represented in the two great public Herbaria of London and environs on the first opportunity.

3. Archangelica brevicaulis.—*Angelocarpa brevicaulis*, Rupr. Sert. Tianschan., p. 48 (1869). When in 1869 my late excellent friend Ruprecht, a botanist from love for botany and not from selfish ambition, made a long stay at Hamburg, he gave me the fruit of this plant, gathered in 1867, wanting me to take the greatest care of it, though not hoping for success. I did my best, and have succeeded in keeping

it through several generations from that time. I feel, however, very sorry to find that the distinctions from *Archangelica*, the angular transsection of the mericarp and the equal, broad wings, prove inconstant. The fruits of the garden plant get nearer and nearer *Archangelica*. The plant grows rather tall, and its name can only be understood by a comparison with a full-grown *A. officinalis*, as tall as a Horse-Guard.

A FEW CORRECTIONS FOR, AND ADDITIONS TO, THE "OUTLINE OF THE FLORA OF SUSSEX."

BY W. B. HEMSLEY, A.L.S.

SINCE my catalogue of Sussex plants* has been in print I have discovered that several common species were inadvertantly omitted in the hurry of copying. Some of these omissions have been pointed out to me by more than one of the contributors to the list, and as I received a few important notes too late for incorporation, I cannot do better, I think, than publish at once what they contain of interest, together with the corrections.

In the first place, I will enumerate the species omitted:—*Viola hirta*, *Prunella vulgaris*, *Carex riparia*, and *Poa compressa*.

The Rev. H. E. Fox has kindly communicated a long list of plants observed in West Sussex, chiefly near Midhurst, during the month of August, 1875. It contains several additions to those indicated in my catalogue for the West Rother District, and one, *Hypericum montanum*, is new to the county. I have not seen a specimen of the latter, but as Mr. Fox's list includes all the other species of *Hypericum* known to occur in Sussex, I have no reason to suppose that he was mistaken. The following are all from W.R., except where otherwise indicated:—*Meconopsis cambrica* (a weed in gardens), *Erysimum cheiranthoides*, *Lepidium Draba*, *Thlaspi arvense*, *Polygala vulgaris*, var. *depressa*, *Stellaria aquatica*, *Spergularia neglecta* (Ar.), *Hypericum montanum*, *Agrimonia odorata*, *Carum segetum*, *Œnanthe*, *Lachenalii*, *Valerianella Auricula*, *Campanula rapunculoides* (weed in gardens), *Lycium barbarum* (quite naturalised on the shore at Bognor, Ar.), *Antirrhinum Orontium*, *Mimulus luteus* (an escape, riverside), *Veronica scutellata*, *Thymus Chamædrys*, *Stachys arvensis*, *Polygonum minus*, *Chenopodium Bonus-Henricus*, *Viscum album* (on one Thorn bush in a garden), *Buxus sempervirens* (without any remark, though most likely planted), *Lemna polyrhiza*, *Eleocharis multicaulis*, and *Carex binervis*.

Mr. B. Helyer, junior, sends the following, among other notes:—*Crambe maritima*, E.R.; *Lathyrus maritimus*, E.R.; *Crithmum maritimum*, E.R.; *Rubus corylifolius*, C.; *Hyoscyamus niger*, E.R.; *Monotropa Hypopitys*, Ad.; *Symphytum officinale*, M.; *Orobanche major*, M.; *Mentha rotundifolia*, W.R.; *Verbascum nigrum*, M.; *Anagallis tenella*, C.; *Myrica Gale*, C.,; and *Epipactis palustris*, Ad-, 1874.

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* See Supplement to last year's (1875) volume.

To Mr. R. A. Pryor I am indebted for some corrections, given with others below, and a few additions, as *Ranunculus Lingua*, E.R.; *Arenaria leptoclados*, W.R.; *Lonicera Xylosteum*, Ad. (several bushes in the lane up to Steyning Borstal, in the hedge of what is now a field, but may once have been a garden); *Hieracium boreale*, Ad.; *Nepeta Cataria*, W.R.; *Anagallis cærulea*, Ad.; *Polygonum amphibium*, var. *aquaticum* O.; *P. a.* var. *terrestre*, W.R.; *P. aviculare*, var. *arenastrum*, Ad.; *Nephrodium æmulum*, O. Mr. Pryor also adds the following from MSS. notes by the late Rev. W. H. Coleman:—*Spergularia marina*, E.R.; *Rosa micrantha*, E.R.; *Calamintha Nepeta*, E.R.; *Scirpus Tabernæmontani*, O.; *Carex distans*, O.; and *Glyceria loliacea*, O.

Mr. F. C. S. Roper adds for the Cuckmere district:—*Ranunculus intermedius*, Hiern, *Fumaria Boræi*, *F. muralis*, *Silene noctiflora*, *Malva borealis** (Mrs. B. Oakeshott), *Ulex Gallii*, *Rubus macrophyllus*, *R. villicaulis* (Mr. B. D. Jackson), *Rosa arvatica* (Jackson), *R. stylosa*, *Carex lævigata*, *Glyceria plicata*, *Bromus arvensis* (Jackson), *Triticum pungens*, and *Aspidium angulare*.

Respecting *Cladium Mariscus*, the Rev. F. H. Arnold writes to the effect that he believes it to be truly wild, and adds that the Rev. J, Fraser gathered it in the lake in Arundel Park, "where there is no likelihood of its having been planted." On this point, however, I cannot agree with him, because I think it very likely that this plant, *Acorus Calamus*, and some others growing in the lake were originally planted there. *Hypericum anglicum* is quite naturalised at Buxted, Ouse, and Mr. Warren lately reported true *Atriplex rosea* from the Adur. The Rev. F. H. Arnold adds the following in W.R.:—*Geranium pyrenaicum*, Chichester; *Stellaria aquatica*, banks of the Lavant; *Petasites vulgaris*, and *Lemna trisulca*. And the Rev. E. Bloomfield sends habitats for the following in E.R.:—*Crambe maritima*, *Lathyrus maritimus*, *Crithmum maritimum*, *Crepis biennis*, *Hieracium sylvaticum*, *Cuscuta Trifolii*, *Listera Nidus-avis*, *Carex fulva*, *Aspidium aculeatum*, var. *angulare* and var. *aculeatum*.

Mr. W. W. Reeves communicates habitats for *Senebiera didyma*, W.R.; *Elatine hexandra*, Eridge Park, M.; *Trifolium suffocatum*, Littlehampton, Ar.; *Prunus Cerasus*, M.; *Myosotis cæspitosa*, M.; *M. repens*, E.R. and M.; *Mentha Pulegium*, M.; *M. alopecuroides*, Racton, W. R. (G. B. Wollaston); *Utricularia minor*, C. (Mr. Bennett); *Butomus umbellatus*, M.; *Juncus acutus*, W.R.; *Carex montana*, Crowborough, M. Mr. Reeves adds some notes on the claims of certain species to be considered wild, for which I have not sufficient space here.

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* We are indebted to Mr. W. W. Reeves for the opportunity of examining this *Malva*. It is doubtless *M. borealis*, Wallm., a plant which has occurred as a casual in several parts of England and also near Dublin. It was first noticed in England near Hythe by Hudson, in the last century, and so got into the books as a native. A plant grown from his seeds was figured in "English Botany," and is in Sowerby's herbarium, fairly agreeing with these Sussex examples.—[*Ed. Journ. Bot.*]

The actual additions to my "Outline" are:—

Ranunculus intermedius, *Hiern.* C.
Fumaria Boræi, *Jordan.* C.
muralis, *Sonder.* C.
*Meconopsis cambrica, *L.* W.R.
Viola hirta, *L.*
*Hypericum anglicum, *Bert.* O.
montanum, *L.* W.R.
*Malva borealis, *Wallm.* C.
Rubus macrophyllus, *Weihe.* C.
*Campanula rapunculoides, *L.* W.R.
*Lycium barbarum, *L.* Ar.
*Mimulus luteus, *Willd.* W.R.
Mentha alopecuroides, *Hull.* W.R.
Prunella vulgaris, *L.*
*Atriplex rosea, *L.* Ad.
Carex riparia, *L.*
Poa compressa, *L.*

Finally, I have a few corrections to make, for most of which I am indebted to my correspondents.

Carex elongata should be struck off the list at page 6 of the "Outline," as it occurs in the Adur district. *Lathræa Squamaria*, Washington, is in the Arun district, as is also *Colchicum autumnale*, Storrington. Twyford, under *Paris quadrifolia*, should be Treyford. For *Melica nutans*, p. 32, read *M. uniflora*. *Rumex pratensis*, Mert. & Koch, is the same as *R. acutus*, L., according to Hooker, though I have quoted them separately. *R. acutus*, Sm., is the same as *R. conglomeratus*. An asterisk should precede *Helleborus fœtidus*, *Fœniculum vulgare*, and *Asparagus officinalis*.

ON *RUMEX HYDROLAPATHUM*, Huds., AND *R. MAXIMUS*, Schreb.

By R. A. Pryor, F.L.S.

There is one point in the character of *Rumex maximus*, Schreb., which seems to have been overlooked in the recent discussions on the subject, although it is noticed by Prof. Babington in the latest (7th) edition of his "Manual," and considerable stress has been laid upon it by at least one of the Continental botanists. Koch (Synops. Fl. Germ., p. 614, ed. i.) concludes his account of *R. Hydrolapathum*, Huds., with the remark, "*Forma petioli hunc* (*R. Hydrolapathum*) *et duos sequentes* (*R. maximus*, and *R. aquaticus* = *R. Hippolapathum*, Fr.), *præter alias notas egregie distinguit*," and in his description he contrasts the leaf-stalks of the two plants now in question in the following terms :—*R. Hydrolapathum*, "*petiolis supra planis*" ; *R. maximus*, "*petiolis supra planis utrinque costa prominula marginatis.*" Meissner, in DC. Prodr. xiv., p. 47, 48, uses almost precisely the same expressions, defining the petioles of *R. Hydrolapathum* as "*supra planis*," of *R. maximus*, "*supra planis nervoso-marginatis.*" Grenier and Godron, and Boreau are also quite in accordance on this point, assigning to them a petiole "tout à fait plan en dessus" (Fl. de France iii., p. 39), "plan" (Fl. du Centre, ed. iii., p. 554), and "plan, ou très superficiellement canaliculé, et marginé" (Gr. & Godr., p. 40), "plans en dessus, mais bordés de chaque côté d'une côte saillante" (Bor. l.c.) respectively. Finally, Babington, whose language is perhaps intentionally harmonised with that of Continental writers, describes the petioles of *R. Hydrolapathum* as "flat but not with raised edges," and those of *R. maximus* as "flat or broadly channelled above with raised edges."

The difference in the shape of the leaf-stalk is sufficiently evident in the dried specimens that I have been able to examine. The petioles of *R. maximus* appear to be more quadrangular in their section, and to be more deeply striated, or rather channelled, and at more irregular intervals than in *R. Hydrolapathum*; they seem also to be firmer in their substance, and do not yield so completely to pressure, but retain more of their original form than is the case with the other plant. A Swedish specimen in the Museum herbarium, from the province of Upland, collected by Ahlberg, and labelled *R. Hydrolapathum*, has quite the petiole-characters here indicated for *R. maximus;* the panicle is altogether immature, and does not offer any distinctive features. There is a certain amount of emphasis in the language employed by Koch, which seems to preclude any hesitation as to the solidity and permanence of the distinction advanced, and whatever may be thought of the value of the character as a specific test, it seems to be well worthy of the attention of British botanists in the living plant, whether the two forms thus separated prove to be invariably distinguishable from each other, or whether, as is perhaps more probable, the extremes are connected by a graduated series of intermediates. It is worth mentioning that from this point of view Mr. Warren's Lewes specimens are entirely *R. maximus.*

NOTICE OF SOME MARINE ALGÆ FROM KERGUELEN ISLAND.

By G. Dickie, M.D., F.L.S.

The marine Algæ found by the Rev. A. E. Eaton at Kerguelen amount in all to 54 species. He has therefore added considerably to the number—37—mentioned in the Antarctic Flora. A full report of his very excellent collection will be given afterwards. I desire in the meantime to notice briefly a few which appear to me to be undescribed.

Sphacelaria corymbosa, n. sp.—Estupose, densely cæspitose, below sparingly and dichotomously branched; upwards, the branches are alternate, subpinnate, and corymbose. The specimens attain a height of two to three inches; no reproductive organs to be seen.

Sphacelaria affinis, n. sp.—Densely cæspitose, erect, sparingly dichotomous; fruit solitary, obovate, and shortly pedicellate. Half an inch in height.

Ptilota Eatoni, n. sp.—Pinnæ opposite, unequal; the pinnules of the shorter pinnæ and the lower pinnules of the longer are subulate, simple, and mostly composed of a single series of large cells; the *favellæ* are terminal and surrounded by an involucre of 4 to 5 pectinate ramuli. Attains a height of five to six inches.

Melobesia Kerguelena, n. sp.—Simple, slightly concave, attached by the centre of the convex surface; margin smooth, sparingly undulate; *keramidia* numerous, mostly in concentric lines; substance thick and hard. Attains a diameter of two and a half inches. The colour is mostly very pale buff variegated with pale red.

DESCRIPTION OF A NEW SPECIES OF *AGARICUS* FROM KERGUELEN ISLAND.

By the Rev. M. J. Berkeley, M.A., F.L.S.

Five species of Fungi were collected in Kerguelen Island during the stay of the English Transit of Venus Expedition, October, 1874, to February, 1875. The following was previously unknown:—

Agaricus (*Galera*) Kerguelensis, *n.sp.*

Cæspitosus, fulvus; pileo e breviter campanulato convexo, lævi, carnuloso; margine tenui, striato; stipite æquali, apice pulverulento-granulato; lamellis distantibus, ventricosis, adnatis.

Hab.—Amongst moss in a bog near Vulcan Cove. January, 1875; Eaton.

Cæspitose, attached by abundant mycelium. Pileus ⅓ inch across; stem nearly 1 inch high, ½-¾ line thick; principal gills about 12 in number, shortly but truly adnate, and not in the least degree decurrent.

It is far more fleshy than any variety of *A. hypnorum*, to which it is doubtless allied closely; and while agreeing, in the comparative fewness of the gills, with *A. embolus*, it differs from this species in the mode of their attachment.

SHORT NOTES.

Naias flexilis in Perthshire (see Journ. Bot. 1875, p. 297).—On the 13th of August last I accompanied my friend Mr. Robb, of Worcester College, Oxford, for a few days' botanising among the aquatic plants of the Loch of Cluny. This loch lies about midway between Blairgowrie and Dunkeld, receiving the waters of the Lochs of Butterstone and the Lawes, and discharging into that of Marlee. Its surface is 157 feet above the level of the sea, and about two miles in circumference. It abounds in such interesting plants as *Elatine hexandra*, *Subularia aquatica*, *Lobelia Dortmanna*, *Nuphar luteum*, *Nymphæa alba*, several species of *Potamogeton*, &c.; and in addition *Stratiotes aloides*, and, I believe, *Butomus umbellatus*, though I have never found it. We found the plant [*Naias*] pretty generally distributed over that part of the loch which we examined, viz., the north-west side, growing on the gravelly and muddy bottom, generally along with *Callitriche autumnalis* or a *Chara*, but sometimes in patches by itself. As seen from the side of the boat—this loch is so clear and limpid that plants may be seen and recognised through six feet of water—a patch of it looks very like *Callitriche*, only somewhat darker and more diffuse. One peculiarity of its growth deserves to be noticed. A considerable depth of water, five feet at least, seems to be necessary to its existence, for nowhere did we find it in the shallow water near the edge. . . The question at once occurred to us, "Is it native?" At first we felt disposed to doubt, knowing as we did that other plants had been introduced into the loch. It is a well-known fact that the Rev. Mr. McRitchie, who was minister of the parish of Cluny during the first thirty years of the present century, was an enthusiastic botanist, and introduced at least *Stratiotes* and *Butomus* in the loch, and *Typha latifolia* into a pond near the church. Of course he would not intentionally, but it has been suggested that he may accidentally have introduced it in seed along with another plant. I incline to think not. On inquiring of Mr. Duff, the intelligent and obliging gardener at Cluny Cottage, we learned that Mr. McRitchie introduced these plants from Wales. Now when we consider how irregularly *Naias* is distributed over Europe—in Sweden, North Germany, and Ireland—it is just as likely to be native in the Loch of Cluny as in Wales, from which it has never been recorded. As far as we could learn, Mr. McRitchie never got plants from Ireland or North America, where I believe *Naias* is common. On the whole, therefore, at present I incline to consider it one of the native rarities of the Loch of Cluny.—A. STURROCK, in "Scottish Naturalist," January, 1876.

THE HYMENIUM OF AGARICUS CAMPESTRIS.—In illustration of the hymenium, or reproductive surface of the gills in the *Hymenomycetes*, Prof. Sachs gives a figure of the minute structure of the common Mushroom (*Agaricus campestris*). But, unfortunately, the figure and description alike are far from correct. Sachs says the basidia in this species produce only two spores, whilst in other *Hymenomycetes* the number is usually four, and the illustration is made to accord with the description. But the fact of the case is there are four spores produced on each basidium in *Agaricus campestris*, and this fact does not apply to *A. campestris* alone, but to every variety of it, and every variety of its numerous allies, of which the common Horse Mushroom *A. arvensis*) is one. Each of the four spicules normally bears a spore, ut it is a common thing in Agarics for the four spores to be produced two at a time, diagonally; as the first two spores become ripe, two other and younger spores appear on the spicules at right angles with the first, and the two latter push the two former off. Sachs was evidently unacquainted with this fact; seeing only two spores at a time on the basidia of the Mushroom, he overlooked the fact that two had already been pushed off, or were not yet produced. It is, however, quite common to see all four spores produced at the same time in the Mushroom, so that there is not the slightest foundation for reducing the basidia in *Agaricus campestris* to the production of two spores only. Le Maout and Decaisne in their "Descriptive and Analytical Botany," p. 953, correctly figure the basidia in *A. campestris* with four spores; but, unfortunately, the description of reference to the basidia and the analogous organs (cystidia) is far from correct.—W. G. SMITH, in "Popular Science Review," January, 1876.

BEDFORDSHIRE PLANTS.—*Medicago lappacea.* As during the last year or two the Dunstable and Luton bonnet-makers have been using large quantities of plait imported from China, and known as "Chinese plait," and as one of the habitats of *Medicago lappacea* is the rice-fields of Hongkong, it seems probable that the seeds of the *Medicago* have come over from China with the plait.—*Orchis incarnata.* If *O. latifolia* is really distinct as a species from this (and I think not), the latter form certainly grows in Totternhoe Mead, near Dunstable, in company with *Pinguicula vulgaris.* Abbot gives *O. latifolia* as common (though of course he may have had the var. *incarnata* in view).—*Cuscuta Epithymum*, var. *Trifolii*, has long been a plague about Dunstable, and Mr. Carruthers has published an account in the "Journal of the Royal Agricultural Society," vol. ix., pt. 1, of the occurrence of this parasite upon Swedish Turnips at Dunstable; the parasite preys there not only upon the foliage and stalks, but the turnips themselves.—*Linaria repens* I have known for the last twelve years on the embankment mentioned, and the locality has been published.—*Adoxa moschatellina* grows in damp places on the hills east of Dunstable.—*Helleborus viridis* grows in great abundance in Whipsnade Wood, near Dunstable.—*Anemone Pulsatilla, Orchis ustulata, Ophrys muscifera* are common at and near Barton-on-the-Clay, not far from Luton.—W. G. SMITH.

Extracts and Abstracts.

ÆSTIVATION AND ITS TERMINOLOGY.

By ASA GRAY.

THE term *æstivation*, to denote the arrangement of the parts of the calyx, corolla, &c., in the bud, as well as that of *vernation* for leaves in a leaf-bud, was introduced by Linnæus. He did not elaborate the former subject as he did the latter, and the few terms given to the modes he recognised are for the most part defined merely by a reference to their use in vernation. Æstivation as a botanical character is comparatively recent, and its terminology is not yet quite satisfactorily settled. I propose to consider, 1, what the leading modes are, and 2, how they are to be designated.

1. In the first place, the modes of æstivation may be conveniently divided into two classes, those in which the parts overlap, and those in which they do not.

Of overlapping æstivation, only two principal kinds need be primarily distinguished, viz.: 1, where some pieces overlap and others are overlapped, *i.e.*, some have both margins exterior and others both margins interior or covered; 2, where each piece of a circle is overlapped by its neighbour on one side while it overlaps its neighbour on the other. There are mixtures and subordinate modifications of these two, but no third mode.

In æstivation without overlapping, there is, first, the rare case in which the parts of the whorl or cycle never come into contact in the bud; and secondly, that in which they impinge by their edges only. There is also the case in which both margins of each piece are rolled or bent inward, and the rarer one in which they are turned outward; and the apex of each piece may comport itself in any of these ways. But these dispositions are those of the pieces or leaves taken separately, and the terms applied to them are the same as in vernation or prefoliation, are used in the same sense, and so are not at all peculiar to æstivation or prefloration. The like may be said of a remaining mode, which, belongs, however, to a different category, that in which the parts being united into a tube or cup, this is bodily plaited into folds, or otherwise disposed. In which case the margin of the tube or cup, or such lobes as it may have, may exhibit any of the modes of æstivation above indicated.

Without further notice, then, of this last, the *plicate* or *plaited* æstivation, and of analogous conformations of the tube or cup of a calyx or corolla, or of the disposition of each piece individually (whether *revolute*, *involute*, *reflexed*, *inflexed*, and the like)—about the terminology of which there is no question—omitting, likewise, for the latter reason, the case of *open* æstivation, there are left three types to deal with:—

I. With some pieces of the set wholly exterior in the bud to others.

II. With each piece covered at one margin, and covering by the other.

III. With each piece squarely abutting against its neighbours on either side, without overlapping.

In modes II. and III. the pieces are all on the same level and are to be viewed as members of a whorl. In mode I., although they may sometimes be members of a whorl, some parts of which have become external to others in the course of growth, they may, and in many cases must belong either to two or more successive whorls (as in the corolla of *Papaveraceæ*, and even the calyx of *Cruciferæ*, the upper or inner of course covered by the lower or outer), or to the spiral phyllotaxy of alternate leaves.

The type of the latter, and the common disposition when the parts are five, is with two pieces exterior, the third exterior by one edge and interior by the other, and two wholly interior. This is simply a cycle in $\frac{2}{5}$ phyllotaxy, the third piece being necessarily within and covered at one margin by the first, while it is exterior to and with its other margin covers the fifth, this and the fourth being of course wholly interior. So, likewise, when the parts are three, one exterior, one half exterior, and one interior or overlapped, the æstivation accords with $\frac{1}{3}$ phyllotaxy. When of eight or higher numbers, the spiral order is usually all the more manifest. When of four or six, the case is one of whorls (opposite leaves representing the simplest whorl), either of a pair of whorls (as in *Epimedium*, *Berberis*, &c.), or a single whorl, the parts of which have overlapped in cyclic order.

2. As to the terminology. Linnæus in the "Philosophia Botanica" treats only of Vernation, there termed *Foliatio*. For this the former term was substituted, and that of *æstivation* for the disposition of petals in a flower-bud, introduced, as I suppose (not having the volume to consult) in the "Termini Botanici," published in the sixth volume of the Amœnitates "Academicæ," 1762. I refer to it only through Giseke's edition, 1781. Here the terms are *convoluta*, *imbricata*, *conduplicata*, defined only by reference to the section *vernatio*, and *valvata*, unhappily explained by a reference to the glumes of Grasses, also "*inæquivalvis;* si magnitudine discrepant." *Imbricata* is the only term besides *valvata* which directly relates to the arrangement of petals, &c., *inter se;* and the reference takes us back to something "tectus, ut nudus non appareat," covered as with tiles we may infer. In the "Philosophia Botanica," under the section *Foliatio*, the definition of *imbricata* is "quando parallele, superficie recta, sibi invicem incumbunt." This would apply either to mode I. or mode II., according as *invicem* is understood; but the diagram, tab. x., 6, shows that case I. is intended. *Convoluta* refers to the rolling of a petal or leaf by itself, as does *conduplicata* to its folding; but Linnæus gives two figures, one of a single rolled-up leaf, the other of one leaf rolled up within another.

Finally, among the modes of vernation indicated by Linnæus, there is one which it is important here to notice, relating as it does to the arrangement of a pair of leaves in the bud, and evidently quite as applicable to a whorl of a larger number of parts than two, *i. e.*—

"*Obvoluta*, quum margines alterni comprehendunt oppositi folii marginem rectum." "Phil. Bot.," 105. Or, in "Term. Bot.," "pagina superiore lateribus approximatis ita ut alterum latus distinguat alterum folium."

This, as the definition and the diagram in the "Philosophia Botanica" show, answers in æstivation to mode II. It was early taken up as such by Mirbel (Elem. Phys. Veg. et Bot., 1815, ii., 738, 739), where the polypetalous corolla of *Hermannia* and *Oxalis* and the gamopetalous corolla of *Apocyneæ* are cited as examples.

Valvate æstivation, our mode III., is rightly defined by Mirbel in the same place, and still earlier by Brown.

Linnæus made no use of æstivation as a character. Nor did Jussieu, except merely that in his "Genera Plantarum," the petals of *Malvaviscus* are said to be *convolute*.

In De Candolle's "Théorie Elémentaire," 1813—a still unsurpassed treatise, upon which, next to the "Philosophia Botanica," our botanical glossology rests—neither the word æstivation, nor its synonym, prefloration, is mentioned, and even vernation or prefoliation is equally omitted.

But the history of æstivation as a botanical character began in a work published three years earlier, viz., in R. Brown's "Prodromus Floræ Nov. Holl.," 1810. The preface notes that it was first accurately observed by Grew. In it Brown *defines* only the *valvate* mode, "ubi margines foliolorum vel laciniarum integumenti invicem applicati sunt, capsulæ valvularum in modum." In the body of the work, wherever it is important, the æstivation is noted as *valvate*, *imbricate*, *plicate*, *induplicate*, &c.; and the open æstivation (*aperta*) is named by him in a subsequent paper.

Being the first to employ æstivation systematically, and to develop its value, Brown's terminology for its modes may well be considered authoritative. And so indeed it is, as far as it goes. But he did not make one important distinction, viz., that between our I. and II. Imbricate, in his use, comprises all kinds of overlapping, that of the corolla of *Apocyneæ* and of a Gentian, as well as that of a Primrose. He must have not only noticed the difference, but also appreciated its general importance, notwithstanding the occasional passage of the one into the other. He must have also observed that in many cases, as in *Asclepias*, for instance, the mode II. passes into mode III., the valvate, and may possibly have discerned that under a phyllotaxic view these are more nearly related than either is to mode I. I find, however, only one instance in which he has indicated the distinction, viz., in the character of *Burchellia*, furnished to the "Botanical Register," t. 435, 1820. Of its corolla it is said: "æstivatione mutuo imbricata contorta." The phrase is interesting, as it seems to recognise the distinction between the mode of overlapping (which is that of our mode II.) and the torsion, which only now and then accompanies it. Looking over the "Plantæ Javanicæ Rariores" to see if there is any later use, I find no instance in which Brown has occasion to speak of this mode II.; but it occurs in the portion of his associate, Mr. Bennett, who (on p. 212) describes the petals of *Sonerila* as "æstivatione *convoluta*." Had this term been thus employed by Brown himself, and at an earlier date, I should regard the terminology of these three modes of æstivation as settled, viz.: I. *imbricata*, II. *convoluta*, III. *valvata*. The first and the third are established beyond question, although somewhat remains to be said about the first.

But meanwhile another use has prevailed as respects the second. In De Candolle's "Prodromus," the first general or considerable work after Brown in which terms of æstivation are employed, this mode is almost uniformly characterised as *contorta*. I cannot at this moment trace the term to its origin. It was probably suggested by the name *Contortæ*, said to have been given by Linnæus to the Apocyneous natural order; and it seemed appropriate to the instances in which the strong convolution of rounded petals, as in *Oxalis*, or their lobes, as in *Phlox,* give an appearance like that of twisting, although there is no twist or torsion. But it is to just such cases, in which there is most of seeming twisting on account of the strong convolution, that the term *convolute* is now and then assigned in the "Prodromus"; as in the character of *Byttneriaceæ,* and that of *Malvaviscus.* The latter may perhaps be explained by the peculiarity that the petals do not uncoil in antithesis. But in *Apocynaceæ,* in the "Prodromus," the terms *convoluta* and *contorta* are seemingly employed synonymously, or nearly so (the latter most frequently); at least I see no difference between the æstivation of *Allamanda,* said to be contorted, and that of *Vinca* (*rosea*), said to be convolute. Endlicher in this regard follows the "Prodromus." In the new "Genera Plantarum" by Bentham and Hooker this mode is most commonly designated as *contorta,* sometimes as *contorto-imbricata,* rarely (*Philadelphus,* &c.) *convoluta.* I have myself, from a period as early as 1840, employed the term *convolute,* thinking it unadvisable to have two names for the same thing, and wishing to restrict, if it might be, the term contorted to cases of torsion. Adrien de Jussieu, on the other hand, used convolute (with strict Linnæan propriety) for regular imbrication with a high degree of overlapping, thus giving two names to different degrees of the same thing.

It being conceded, I presume, that the mode II. should be specifically distinguished, what name, on the whole, ought it to bear? If we follow prevalent usage, *contorta* will be the term. But this term was unknown in this sense to the founders of æstivation, Linnæus and Brown; it correctly expresses the real state of things in only a few cases; and where there is torsion, it leads to a most awkward way of expressing it. We have to write, "lobes of the corolla contorted and twisted: *corollæ lobi contorti et torti,*" introducing *dextrorsum* or *sinistrorsum,** to express the direction of the overlapping and of the torsion, which are not always the same. So that the most current name is the least appropriate. *Convoluta* is as good a name as can be, and its use in the present sense is not unconformable with the Linnæan use in vernation. When well carried out, three or five or more petals, as the case may be, are simply rolled up together. When the overlapping is slight, there is simply the tendency to convolution. But if, as in other nomenclature, priority gives a paramount claim, *obvoluta* will be the proper term, beginning as it did with Linnæus for vernation, and taken up, as it was very early, by Mirbel for æstivation. The only objections to it are, first, that it has never come into systematic use, and, second, that *ob,* in the composition of botanical terms, commonly stands for obversely or inversely. But *obvoluta* is not burdened with this signification: it is classical for "wrapped round," as is *convoluta* for rolled together. I conclude that one or the other of these two terms ought to be used.

Finally, although there is little, if any, practical misuse, there is some mis-definition, of the term *imbricate* as applied to æstivation. Adrien de Jussieu defines it well (in "Cours Elémentaire," 308) in the phrase "La préfloraison spirale est aussi nommé *imbriquée*"; and in noting that when the number stops at five, the pieces fall into two exterior, two interior, and one (the third in the spiral) intermediate, this making what is called *æstivatio quincuncialis*.* This is clear and to the point. But other authors have had a fancy for distinguishing between quincuncial and imbricate (as if the former were not the typical case of the latter when the parts are five), and so have had to devise something else to answer to imbricate. Alphonse De Candolle (in his Introd. Bot., i, 154, written before phyllotaxy was well understood), after relegating *imbricative* to the category of a crowd of verticils, and remarking that the quincuncial is sometimes confounded with the imbricate, adds: some confound also under this latter name the case in which there is one exterior piece, one interior, and three covered at one margin but free at the other. I know not where this began; but its latest reproduction is in Le Maout and Decaisne's Traité Général, and in the English translation of it. In the diagram the pieces are numbered directly round the circle from 1 to 5, the fifth coming next the first: "so they thus complete one turn of a spiral"—which shows that Le Maout had vague ideas of phyllotaxy, of which he seems to have invented a new ($\frac{1}{5}$) order. Moreover this is essentially identical with the *cochlear* æstivation of the same work (not of Lindley); and Eichler, in his "Blüthendiagramme," adopts this name (unsuitable though it be) for this particular arrangement, whatever be the position of the enclosed or enclosing petal. A glance shows that this supposed "true imbricate æstivation" is a slight and not very uncommon deviation (by the displacement of what should be the interior margin of one of the petals during growth) of the mode II., variously termed obvolute, convolute, or contorted æstivation. But it is so intermediate between this and the quincuncially imbricate as perhaps to justify Brown in applying the name imbricate generically to all the overlapping modes. I see, since the above was written, that Eichler, in his "Blüthendiagramme," in effect does this. I find also that Eichler uniformly employs the term *convolute*, or *convolutive*, as I have done, instead of contorted. I should hope, rather than immediately expect, that this use would become general.—[From the "American Journal of Science and Arts," vol. x., Nov., 1875.]

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* I note with satisfaction that Bentham and Hooker use these terms to signify from left to right, or from right to left, of a person supposed to stand outside of the closed bud, which is surely the natural position of the observer.

Notices of Books.

Plantæ Abyssinicæ collectionis nuperrimæ (*a.* 1863-8) *schimperianæ enumeratæ* [Compositæ], auctore W. VATKE. [Linnæa xxxix., pp. 475-518 (1875).]

THE distribution of the sets of this collection of Schimper's Abyssinian plants was made by Mr. J. J. Bennett in the year 1869 from the British Museum, where he deposited a very rich set, accompanied by the original tickets of Schimper, with his manuscript numbers and notes. The specimens were gathered in the Abyssinian provinces of Tigre and Amhara, mostly in the former province, and in the years 1862 and 1863. Schimper himself sent also in the year 1869 a full set to the Royal Herbarium at Berlin; and it is from this set that Vatke elaborated the above-cited paper, which comprises notes of localities, altitudes, vernacular names, economic uses, and dates, such as are found on the original tickets in the British Museum, and in most cases, if not in all, identical with them.

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* The name *quincuncial* answers the purpose after definition, and has long been in use; but this arrangement in diagram is wholly unlike the *quincunx*, with its four pieces or stars in the periphery, or at the angles of a square, and one in the centre.

For the purpose of his determinations Vatke was unfortunately unable to consult Achille Richard's "Tentamen Floræ Abyssinicæ," the first volume of which, published at Paris in 1847, contains the order of the Compositæ, inasmuch as he failed to find this French book in the Royal Library at Berlin, and he was therefore compelled to take the descriptions of Richard's species at second hand from the second volume of Walper's "Annales Botanices Systematicæ" (1852). Type-specimens, however, of some of Richard's species appear to exist in the Berlin herbarium, for Vatke indicates by the usual sign that he has in certain cases seen authentic specimens.

For the genera Vatke has pretty strictly followed Bentham, and has accordingly transferred in detail several species into their right genus as mentioned or generally suggested in the first part of the second volume of Bentham and Hooker's "Genera Plantarum" (1873).

Besides this set of Schimper's plants, Vatke has also given in their places the numbers of the set of the year 1853, which were distributed with names from Paris. From the total number of this latter set noted by Vatke, it would appear that the 1853 set at Berlin is scarcely so rich as that of the same set at Kew.

Professor Oliver and I have had occasion to examine the Abyssinian plants of Schimper, and to determine their names, in order to include them in our work on the Compositæ which we have some time ago jointly written for the third volume of the "Flora of Tropical Africa," but which is not yet published.

As might have been expected, we all agree in the determination of the majority of the species, but there are some cases where we differ from Vatke; I propose therefore to give the principal instances of divergence. The majority of such cases are not at all important, being either a reference of an Abyssinian species to one not previously considered to be such, or an objection to such reference, or, in other cases, a difference of opinion regarding the range of specific variation among purely Abyssinian forms. With regard to this latter class of cases, I do not desire to lay much stress, being fully aware what widely different views exist among very excellent botanists with regard to specific values. It has been often said that, notwithstanding differences of previous education and mental constitution, workers at a large herbarium like Kew usually come to a nearly or at least fairly equivalent result on this point of specific values; and on comparing our work at Kew and at the British Museum on Schimper's Abyssinian Compositæ with that of Vatke at Berlin, I think that the average values which Vatke and we attach to specific characters are not very different, although Vatke and we differ considerably in a few cases. Thus the whole of the Compositæ of the 1862-3 distribution of Schimper are assigned by Vatke to 141 species, comprised in 62 genera, while we should place the same material in 144 species, comprised in 63 genera. The following are the principal discrepancies that I have detected between Vatke's determinations and our own:—

VERNONIA POLYMORPHA, *Vatke*. Under this name Vatke treats of four forms: α. ADOENSIS (*V. adoensis*, Schultz Bip., = *V. macrocephala*, A. Rich.), β. AMBIGUA (*V. Kotschyana*, Schultz Bip.), γ. ACCEDENS, and δ. MICROCEPHALA (*V. abyssinica*, Schultz Bip., = *Teichostemma fruticosum*, R.Br.). Each of these forms of Vatke we regard as a distinct species.

The plant (no. 1530) which Vatke calls VERNONIA HYMENOLEPIS, *A. Rich.* "*!*" seems to us quite different from the specimens of this species authentically named in the Kew herbarium; we have described it under a new name of our own.

VERNONIA LEOPOLDI, (*Schultz Bip.*), *Vatke*, and V. BIPONTINI, *Vatke*, we regard as together forming one species.

VERNONIA (CYANOPIS) FLAGELLARIS, *Vatke*, is the same as *V. urticæfolia*, A. Rich., the type-specimens of which we have seen.

We agree in uniting CONYZA SCHIMPERI, *Schultz Bip.*, to the Indian plant *C. stricta*, Willd., and we add to the same C. MACRORHIZA, *Schultz Bip.*, which Vatke keeps distinct; though we do not associate with these the plant numbered 238, which is a *Conyza*, but which we do not identify with any described species.

The specimens (no. 294 and no. 436) which Vatke refers to CONYZA ABYSSINICA, *Schultz Bip.*, we had referred to two different species, one (no. 294) to *C. Hochstetteri*, Schultz Bip., and the other (no. 436) to *C. pyrrhopappa*, Schultz Bip.; but the species of *Conyza* are critical and exceedingly difficult to discriminate.

Under the name of CONYZA HOCHSTETTERI (*Schultz Bip.*), Vatke treats of four forms: α. AGRESTIS (*C. Hochstetteri*, Schultz Bip.), β. PRATENSIS, γ. SYLVESTRIS, and δ. MONTANA (*C. variegata*, Schultz Bip.). We regard each of Schultz's species as good, and Vatke's forms β. and δ. we combine to form a new species.

BLUMEA BOVEI, *Vatke*, founded on the *Conyza Bovei*, DC., and being the *B. abyssinica*, Schultz Bip., we prefer to call by the last-mentioned name; at all events, the specific name of De Candolle has been referred to *Blumea* by Bentham and Hooker, Gen. Pl. ii., 290.

LAGGERA HETEROMALLA, *Vatke*, is a species of *Inula*; and we identify it specifically with *I. Mannii*, Benth. & Hook. f., that is, *Vernonia* (?) *Mannii*, Hook. f.

The plant (no. 1349) which Vatke refers to SPHÆRANTHUS ANGUSTIFOLIUS, *DC.*, differs from it by solitary hermaphrodite florets; it is the *Oligolepis angustifolia*, Steetz.

GNAPHALIUM AURICULATUM, *A. Rich.* The specimen (no. 1441) which Vatke thus names we refer to *G. Petitianum*, A. Rich.; we have seen authentic types of both species, which, however, certainly lie very close together.

GNAPHALIUM ULIGINOSUM, *L.* The specimen (no. 68) we refer to *G. Unionis*, Schultz Bip., which appears to us to be distinct from *G. uliginosum*, L., by the white scarious tips of its involucral bracts.

HELICHRYSUM STEUDELII, *Schultz Bip.*, is called by us *Gnaphalium Steudelii*, Schultz Bip., and indeed is mentioned as belonging to the latter genus by Bentham and Hooker, Gen. Pl. ii., 306.

HELICHRYSUM GLOBOSUM, *Schultz Bip.*, *β.* RHODOCHLAMYS, *Vatke*, is *H. purpureum*, Oliv. et Hiern ex Benth. et Hook. f. Gen. Pl. ii. 306, and may be correctly treated as a variety rather than a distinct species.

ANTITHRIXIA ABYSSINICA, *Benth. et Hook. f.* The plant (no. 1443) we make a new species of the genus, being the third species alluded to in the "Genera Plantarum."

INULA ARBUSCULA, *Del.* The plant (no. 613) we refer to *I. confertiflora*, A. Rich., as well as that (no. 1474) so referred to by Vatke.

SIEGESBECKIA ORIENTALIS, *L.*, var., Vatke. The plant (no. 519) we regard as a new species of *Sigesbeckia.*

COREOPSIS PRESTINARIA, *Schultz Bip.* We agree as to the plant numbered 429; but those numbered 71 and 1423 we refer to *C. macrantha*, Schultz Bip.

COREOPSIS ABYSSINICA, *Schultz Bip.*, forma latisecta. This plant (no. 329) we regard as a new species of this genus.

CINERARIA GRANDIFLORA, *Vatke.* This plant (no. 1517) we had treated as a variety of *C. abyssinica*, Schultz Bip., differing from the type of the species by the presence of large ligules to the ray-florets.

SENECIO ÆGYPTIUS, *L.* We do not agree in uniting *S. pinnatipartitus*, Schultz Bip., to the Linnean species, and retain Schultz's name for the plant numbered 635.

SENECIO GATTATENSIS, *Vatke*, does not appear to us to differ specifically from *S. vulgaris*, L.

SENECIO CONFERTUS, *Schultz Bip.* We agree in so naming the plant numbered 1521, but that numbered 1532 we consider to be a new species of *Senecio.*

SENECIO NANUS, *Schultz Bip.* We follow Bentham and Hooker, Gen. Pl. ii., 451, in referring this species to the genus *Werneria.*

CNICUS CHAMÆCEPHALUS, *Vatke* (no. 1412), is a species of *Carduus.*

CENTAUREA VARIANS, *A. Rich.* We retain *C. abyssinica*, Schultz Bip., as a distinct species, not as a variety of Richard's species.

In a few cases the specimens that we have seen have been too imperfect for us to feel quite sure of their species, but in some state or other we have seen nearly all the numbers quoted by Vatke. A few remain to mention that Vatke has not quoted:—

205. *Aspilia Kotschyi*, Benth. et Hook. f. "In ?Sümpfen-Ebene, Hamedo, 4500′ über Meer, 14 Sept., '62."

1529. *Senecio*, sp. nov. "Grosse Standen ähnliche Planze am Rand der Sümpfe, 8500' über Meer, 1 Novbr., '63."

The plants numbered 572, 559, and 1352 are *Psiadia*, *Gynura*, and *Senecio clematoides*, Schultz Bip., respectively. These numbers are not quoted by Vatke, but specimens without number and with localities, &c., and probably intended for the numbered plants, are given.

With regard to *Psiadia arabica*, Jaub. et Spach (no. 572), I may mention that this is synonymous with *Nidorella punctulata*, DC.

Prodr. v., 323 (1836), which is founded on specimens collected by Burchell (1677, 2061) in the Asbestos Mountains, in extra-tropical South Africa, north of the Orange river; it is also the same species as a specimen in the Kew Herbarium from St. Augustin, Madagascar, named in Bojer's writing *Psiadia linearifolia*, Boj., but does not agree with the description of *P. linearifolia*, DC. In Peters Reise Mossamb., Bot., Steetz has given in a note a monograph of the genus; but we are unable to separate specifically without considerable doubt his *P. dodonææfolia* from the Abyssinian plant.

In concluding this notice of Vatke's careful paper, I may add the circumstance, not given by him, that an *Orobanche* (no. 527) is parasitical on the root of *Gnaphalium Steudelii*, Schultz Bip.

W. P. Hiern.

Elementary Lessons in Botanical Geography. By J. G. Baker, F.L.S. London: Lovell Reeve and Co. 1875. (pp. 110.)

This little volume consists of reprints, with slight alterations, of the articles on Botanical Geography which have been printed in the "Gardener's Chronicle" during the past year. There are twelve chapters or lessons, each containing a summary of the facts bearing on some special portion of the subject. One has been printed in our columns (1875, p. 184), and will give a good example of the mode in which the subject is treated. The bulk of the book (ten chapters) is devoted to climate and its influence on plant-distribution, a single chapter only being given to the influence of man, and another to the results of changes in the past physical changes of the globe.

The subject of the distribution of plants is so lightly touched upon (or altogether omitted) in text-books of Botany, that Mr. Baker's volume really supplies a deficiency, and unquestionably fills it in a very satisfactory manner.

H. T.

Botanical News.

Articles in Journals.

Flora (November, 1875).—L. Celakovsky, "On the interposition of the staminal whorl."—C. Kraus, "On the origin of vegetable colouring-matters."—F. Arnold, "Lichens of the French Jura. Supplement."

December, 1875.

Flora.—C. Müller, "Musci novo-granatenses" (*Schliephackea*, gen. nov.)—K. Prantl, "Branching of the stem in some Ferns."—O. Böckeler, "Notes on a number of *Carices* named from abnormal states of certain species."

Bot. Zeitung.—F. Kienitz-Gerloff, "Researches on the development of the sporogones in Livermosses" (contd.).—W. Velten, "On the development of the cambium and N. J. C. Müller's ideas on this subject."

Hedwigia.—J. Schroeter, "On some American *Uredineæ*" (contd.).—J. Juratzka, "Two new Mosses."

Œsterr. Bot. Zeitschr.—J. Kerner, "On the Flora of Lower Austria" (contd.).—F. Hauck, "Marine Algæ of the Gulf of Trieste" (contd.).—C. Haussknecht, "On introduced plants."—J. Kerner, "Distribution of Hungarian Plants" (contd.).—E. Bock, "An ascent of Triglav."—F. Antoine, "Botany at the Vienna Exhibition" (contd.).

Grevillea.—M. J. Berkeley, "Notices of N. American Fungi" (contd.).—M. C. Cooke, "British Fungi."—Id., "A new Scotch *Peziza*" (*P. coprinaria*, Cooke).—F. de Thumen, "Symbolæ ad Flor. Mycologicam Australiæ."—G. Davies, "*Blyttia Mörkii*, N. ab E., in Britain."—W. A. Leighton, "New Irish Lichens."—W. Phillips, "Parasitism or polymorphism?"—Id., "A new British *Ascobolus*" (*A. amethystinus*).—Nylander, "On *Ramalina limborina*, Nyl."

Bull. Bot. Soc. Belgique (xiv., 2).—B. C. Du Mortier, "Note on *Scrophularia Tinantii*" (= *S. betonicæfolia*, Tinant).— Rosbach, "*Saxifraga multifida*, n.s., & its allies."—J. P. J. Koltz, "Biographical notice of H. J. N. de Crantz."—F. Schultz, "Observations on the 'Statistique bot. du Forez' of M. A. Legrand."—F. Crépin, "Primitiæ Monographiæ Rosarum, fasc 3" (contd.).—C. J. Lecoyer, "On *Thalictrum*" (chronological list of known species).—L. Errera, "Vegegation round Nice."—F. Crépin, "On some Devonian fossils" (tab. 1-6).—Rapin, "Two new Roses" (*R. Mureti* and *R. Lereschii*, Switzerland).—A. Cogniaux, "Division of *Anguria* into four genera."

Bot. Notiser (17 Dec.).—N. J. Scheutz, "Notes on Swedish plants."—J. E. D. Iverus, "Attempt to arrange Swedish species of *Trifolium*."—V. F. Holm, "Excursion in Lapland and Norway."

New Books.—A. Jaeger, "Adumbratio muscorum totius orbis tenarum," vol i., 1870-75 (Berlin, 28mk.)—M. C. Cooke, "Mycographia seu Icones Fungorum," part i. (Williams & Norgate, 12s.).

The second part of vol. i. of the Linnean Society's Transactions (second series) contains a paper by the Rev. G. Henslow on the prevailing systems of Phyllotaxis, and an important memoir by Mr. Miers on the *Barringtoniaceæ* (illustrated by nine plates), in which sixty-seven species are fully described under ten genera, of which latter, four are now first defined.

The English translation of Prof. Baillon's "Histoire des Plantes" has reached a fourth volume, containing Nyctagineæ, Phytolaceaceæ, Malvaceæ, Tiliaceæ, Rutaceæ, and other thalamifloral Orders.

The 68th fasciculus of the "Flora Brasiliensis," published last year, contains the *Amarantaceæ* by Seubert, and completes vol. v., pt. 1, of this great work as systematically arranged.

The "Boletin" of the National Academy of Sciences, Cordova, Buenos Ayres, has reached its fourth number, and contains a very extensive account of the vegetation of the province of Tucuman, by M. Jorge Hieronymus.

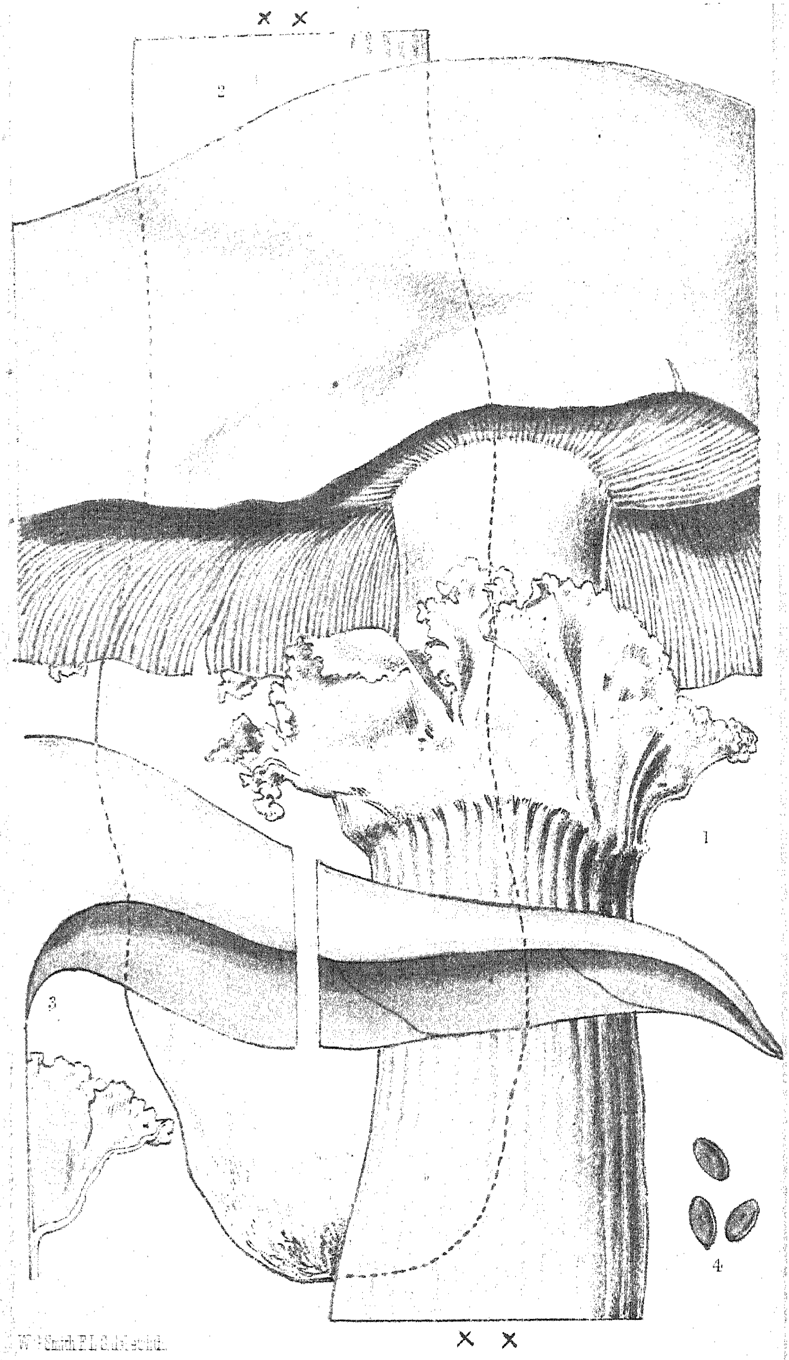

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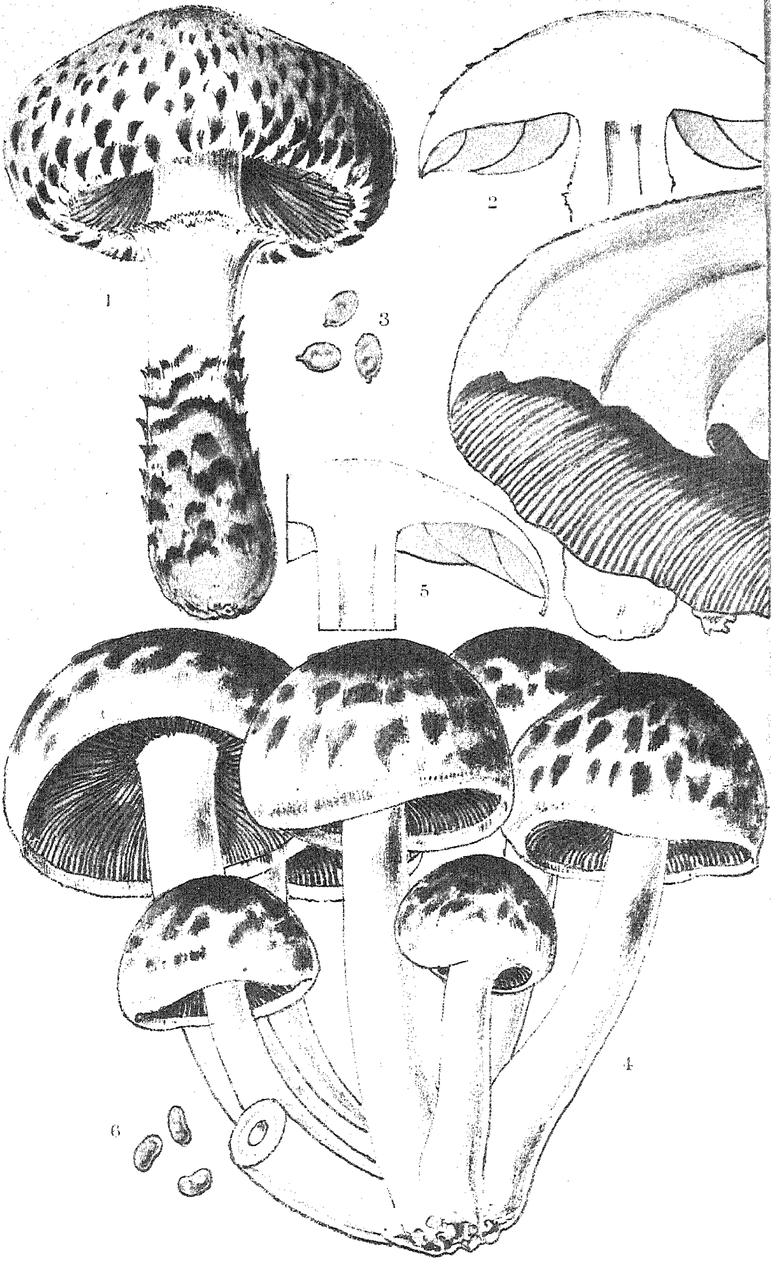
Fig. 1-4 Agaricus (Pholiota) aureus *Matt.*

Tab. 17



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Original Articles.

NEW AND RARE HYMENOMYCETOUS FUNGI.

By Worthington G. Smith, F.L.S.

(Tab. 176, 177.)

The accompanying plates illustrate three species of Fungi recently added to our lists and exhibited at the Fungus shows at Hereford, Perth, and London. *Agaricus aureus*, Matt., was first found in the neighbourhood of Hereford by Mr. Renny, and the form there found has been described by that gentleman in the "Transactions of the Woolhope Club" as a distinct variety, under the name of *Herefordensis.* There are several very distinct varieties of this species, and Fries himself originally separated one as distinct under the name of *A. Vahlii*. Near Perth, however, and in the Moncrieffe Woods last autumn all the varieties of *A. aureus* were found, one of which, and distinct in trifling characters (notably in the attachment of the gills) from the Hereford plant, is illustrated on plate 177. Another *Pholiota*, *A. unicolor*, Fr., has been found near Hereford by Mr. Renny. *Agaricus* (*Stropharia*) *caput-Medusæ*, Fr., has been found several times by the Rev. J. Stephenson near Glamis, and was exhibited at the last Fungus show at Perth. It is everywhere rare, and a handsome and good type of the subgenus to which it belongs. *Agaricus Storea*, Fr., has been found near Hereford and Perth, and exhibited at these places; it has also been found at Reading, Weybridge, and elsewhere, and exhibited in London. It is equally handsome with the last, and an equally good type of another and allied subgenus, *Hypholoma*. Another interesting *Hypholoma*, *A. cascus*, Fr., has been met with by Dr. Buchanan White in Rannoch, Perthshire.

In 1873, p. 205, we published a figure in the Journal of Botany of an extraordinary new and minute species of *Lactarius*, under the name of *L. minimus*. Since then this unique species has been met with near Forres, N.B., by the Rev. James Keith, and identified by the Rev. M. J. Berkeley.

Explanation of Plates.

Tab. 176.—Fig. 1, *Agaricus* (*Stropharea*) *caput-Medusæ*, Fr. Fig. 2, Section of ditto. Fig. 3, Spores of ditto enlarged 700 diam. Fig. 4, *Agaricus* (*Hypholoma*) *Storea*, Fr. Fig. 5, Section of ditto. Fig. 6, Spores enlarged 700 diam.

Tab. 177.—Fig. 1, 2, *Agaricus* (*Pholiota*) *aureus*, Matt. Fig. 3, Section of ditto. Fig. 4, Spores of ditto enlarged 700 diam.

ON TWO NEW AMARYLLIDACEÆ FROM NATAL.

By J. G. Baker, F.L.S.

In a packet of Monocotyledons just received from the Rev. J. Buchanan, of Durban, are the two following interesting novelties:—

Cyrtanthus (*Gastronema*) luteus, *Baker*, n. sp.—Bulbus ovoideus tunicis membranaceis. Folia 2-3 angustissime linearia glabra subsynanthia 2-3 poll. longa. Scapus gracilis uniflorus erectus 1-2 poll. longus. Spathæ valvæ geminæ lineares membranaceæ pollicares. Pedicelli 1½-2 lin. longi. Perianthium luteum erectum infundibulare 9-12 lin. longum, segmentis oblanceolatis dorso subtiliter 7-9-nervatis tubo infundibulari 2-3-plo superantibus. Stamina biseriata, 3 inferiora ex tubo exserta, 3 superiora limbo duplo breviora. Stylus antheras superans, stigmatibus tribus subulatis patulis.

Cyphonema Buchanani, *Baker*, n. sp.—Bulbus globosus ½-1 poll. crassus, tunicis membranaceis supra collum longe productis. Folia hysteranthia ignota. Scapus brevissimus, in tunicis bulbi occultus. Spatha univalvis membranacea pollicaris ovarium amplectens, apice dentibus 2-3 linearibus rubro-tinctis instructa. Tubus supra ovarium filiformis 12-18 lin. longus, apice dilatato late infundibulari 3-4 lin. longo, segmentis ascendentibus linearibus vel oblanceolatis 12-15 lin. longis albidis dorso subtiliter æqualiter nervatis 1½-3 lin. latis. Stamina biseriata, antheris 3 lin. longis, 3 inferioribus in tubi apice inclusis, 3 superioribus e tubo exsertis.

ON THE GENUS *SYRINGODEA*, Hook. fil.

By J. G. Baker.

The genus *Syringodea*, in *Iridaceæ*, founded by Dr. Hooker two years ago in the "Botanical Magazine," under tab. 6072, upon a plant sent by Mr. Bolus from the Cape, and cultivated in Kew Gardens, is one of great interest, as it furnishes from the southern hemisphere a close approximation to *Crocus*, which is confined to the North Temperate zone in the Old World. It has the same long perianth-tube proceeding from an ovary which is subtended by two long spathe-valves and produced from the centre of a rosette of leaves almost from the surface of the soil, and the same regular perianth. The flowers are not so conspicuous as in *Crocus*, as the limb of the perianth is less than an inch in length, and the stigma is materially different, being just like that of a *Gladiolus*. Upon the whole it may perhaps be most safely regarded as an intermediate step between *Crocus* and *Romulea* (*Trichonema*), which latter is abundantly represented both at the Cape and, along with *Crocus*, in the Mediterranean region. The original species had a hypocrateriform perianth, with the segments of the limb spreading horizontally when fully expanded, and deeply emarginate, like the petals of a *Stellaria*. There are two other plants, of one of which there is a copious suite of specimens in the Kew Herbarium, which has been described by Klatt as a *Trichonema*, and another gathered by

Bowie and preserved in the British Museum, which agree with original *Syringodea* in all points except that the segments of the perianth-limb are entire and do not expand so fully. I would therefore propose to modify the generic characters so as to include these, and add from one of the Kew specimens the character of the capsule, which is substantially that of its neighbours *Crocus* and *Romulea*.

Genus SYRINGODEA, *Hook. fil.*, Bot. Mag., tab. 6072. (Orde *Iridaceæ*. Tribe *Ixieæ*.)—Perianthium corollinum, hypocrateriforme vel infundibulare, segmentis 6 æqualibus obovatis integris vel interdum emarginatis, flore expanso ascendentibus vel patulis, tubo gracili elongato. Stamina 3, ad faucem tubi inserta, æquilateralia, erecta, limbo breviora, filamentis brevibus liberis filiformibus, antheris basifixis lineari-sagittatis. Ovarium triloculare, ovulis in loculo pluribus horizontalibus; stylus tubum paulo superans, stigmatibus tubus patulis integris cuneatis. Capsula oblonga, membranacea, seminibus plurimis minutis turgidis. Herbæ bulbosæ capenses, foliis synanthiis setaceis duris, persistentibus, spathæ valvis membranaceis, floribus parvis evanescentibus.

1. S. PULCHELLA, *Hook. fil.*, *loc. cit.*—Bulbus globosus, 6-8 lin. crassus, uniflorus tunicis brunneis membranaceis. Folia 4-6, setacea, falcata, glabra 3-4 poll. longa. Spathæ valvæ lanceolatæ, 6-9 lin. longæ. Tubus cylindricus, 1½-2 poll. longus, superne crassior. Limbus concolor, pallide purpureus, segmentis obovato-cuneatis profunde emarginatis, flore expanso patulis.—*C. B. Spei, in campis montis Sneewberg, alt.* 4500 *pedes*, Bolus, 1852!

2. S. BICOLOR, *Baker*; Trichonema longitubum, *Klatt in Linnæa*, 34, 665.—Bulbus globosus, 1-4-florus, 6-8 lin. crassus, tunicis brunneis membranaceis secus collum 1-2 poll. longum productis. Folia 6-8, setacea, falcata, 3-6 poll. longa, glabra vel pilosa. Spathæ valvæ lanceolatæ, 6-18 lin. longæ. Tubus filiformis, purpureus, 1-2 poll. longus. Limbus saturate purpureus, fauce luteus, segmentis obovatis obtusis integris 3-4 lin. longis, flore expanso ascendentibus imbricatis. —*C. B. Spei, Somerset*, Bowker!, *Colesberg*, Dr. Shaw!, *Grahamstown*, McOwan!, *Graaf-reinet*, Bowker!, *Fat River*, Burke, 446!

3. S. FILIFOLIA, *Baker*.—Bulbus oblongus uniflorus, 3 lin. crassus, tunicis brunneis nitidis duris cuspidatis. Folia 6-8, setacea, glabra, 1-1½ poll. longa. Spathæ valvæ lineares, membranaceæ, 5-6 lin. longæ. Tubus filiformis, 1 poll. longus. Limbus 6 lin. longus, lilacino-purpureus, fauce luteus, segmentis obovatis, ascendentibus, integris.—*C. B. Spei*, Bowie in Herb. Mus. Brit.

THE APETALOUS FUCHSIAS OF SOUTH AMERICA, WITH DESCRIPTIONS OF FOUR NEW SPECIES.

By W. B. HEMSLEY, A.L.S.

So far as I am aware, descriptions of only two South American species of *Fuchsia* destitute of petals have hitherto been published. The first, *F. apetala*, was described and figured by Ruiz and Pavon in their "Flora Peruviana," vol. iii., p. 89, t. 322, fig. b. (1802); and the second, *F. macrantha*, by Sir William Hooker, in the "Botanical Magazine," t. 4233 (1846). But there are specimens in the Kew Herbarium of three, if not four, undescribed species; the whole forming a very distinct section, differing from the petalous series in several important characters. Indeed, were it not that the New Zealand species are intermediate in character, the South American apetalous Fuchsias would constitute as good a genus as many of those generally admitted. However, after examining the various modifications of structure offered by the different species commonly referred to this genus, it does not appear desirable to separate them under different genera. The species under consideration, as far as the material I have been able to examine goes to determine the question, are strictly and invariably apetalous. On the other hand, the New Zealand species have either no petals or only very small ones. With the exception of *F. membranacea*, all the South American species are described by collectors as climbing epiphytes or as trailing over rocks, and this may be of the same nature for any evidence we may have to the contrary, whereas the New Zealand species are terrestrial. The species of both regions possess in common the character of alternate leaves. In the New Zealand species there seems to be a tendency towards a separation of the sexes, as in some of the small-flowered petalous Mexican species, whilst the American are apparently strictly hermaphrodite; and the calyx-tube is more or less prominently 8-ribbed, the ribs corresponding to the lines of the attachment of the filaments. A peculiarity of some of the American species is to be leafless during the flowering period; indeed, nos. 1 to 4 are more or less characterised by the absence of leaves when in flower.

I have seen no leaves at all of *F. insignis*, which all collectors described as leafless; and I have only seen quite young ones, at the tips of the branches, of *F. apetala*, *hirsuta*, and *macrantha*. All these four species shed their bark, and have stout warty branches bearing clusters of flowers at their tips. The other two, *F. membranacea* and *F. salicifolia*, are remarkably distinct from the foregoing and from each other. They have slender branches, clothed with foliage when in flower, and axillary flowers borne throughout the whole length of the branches. For convenience I here give brief descriptions of all the South American apetalous species known to me. They are restricted to the mountains of Peru, Ecuador, New Grenada, and Venezuela. The following key will aid in distinguishing them.

Leaves large, hairy, ovate or cordate, appearing after or with the flowers, which are clustered at the ends of the branches.
  Stamens not exceeding the sepals; sepals very short in proportion to the tube, ovate.
    Flowers 4-6 inches long, nearly or quite glabrous on the outside . . . 1. *macrantha.*
    Flowers about 2 inches long, very hairy on the outside . . . . . 2. *hirsuta.*
  Stamens exserted; sepals ovate or lanceolate, half or a third as long as the tube.

Flowers sparsely hairy, 3-4 inches long; sepals lanceolate, nearly as long as the tube; stamens and style very much exserted . . . . . 3. *insignis.*

Flowers sparsely hairy, 2½-3 inches long; sepals ovate-lanceolate, one-third the length of the tube; stamens and style shortly exserted . . . . 4. *apetala.*

Leaves small, glabrous, lanceolate or elliptical, fully developed when the flowers appear; flowers axillary, borne throughout the length of the branches.

Leaves thin in texture, broadly ovate-lanceolate or elliptical, borne on long slender petioles . . . . 5. *membranacea.*

Leaves thick in texture, linear-lanceolate, acuminate, borne on stout short petioles . 6. *salicifolia.*

1. *F. macrantha*, Hook., Bot. Mag., t. 4233.—Frutex per arborum truncos radicans, ramis crassis, cortice deciduo, foliis amplis alternis ovatis acutis integerrimis, junioribus utrinque villosis cum floribus productis, floribus ad apices ramulorum confertis, pendentibus, 4-6 poll. longis, pedicellis brevibus axillaribus solitariis vel aggregatis, calycis tubo 8-costato cylindraceo sursum gradatim expanso, limbo laciniis late ovatis sub-obtusis erecto-patentibus 4-6 lineas longis, staminibus inclusis, ovario elongato turbinato 4-sulcato, stylo exserto basi hirsuto, stigmate capitato.—Peruvia, supra arboribus in montibus altissimis, Andimarcæ, *Mathews*, no. 1197, *Maclean*, *Pearce*, &c.; Columbia, *Lobb.*

This fine species is the only one of the section that has been in cultivation in this country. It was introduced by Messrs. Veitch, through their collector, Lobb, in 1845, and was exhibited by them at the Horticultural Society's Rooms in April, 1846. It is easily distinguished from all other apetalous species by its very long flowers, short sepals, and included stamens.

2. F. HIRSUTA, *n.sp.*—Frutex epiphytus vel supra rupibus umbrosis radicans per anthesin aphyllus, ramis brevibus crassis tortuosis, cortice deciduo, foliis alternis ovatis junioribus utrinque pubescentibus, floribus pilosis parvis ad apices ramulorum confertis, pendentibus, pedicellis ad 6 lin. longis, calycis tubo 1½-2 poll. longo superne sensim latiore, limbo laciniis late ovatis obtusis 3-4 lin. longis, staminibus inclusis, ovario dense piloso, stylo paulo exserto.—Peruvia, *Lechler*, no. 1989.

I have only seen quite young specimens of this species, but it is very distinct in its very small shaggy flowers.

3. F. INSIGNIS, *n.sp.*—"Frutex epiphytus, cortice deciduo, ope radicularum ad Hederæ instar alte scandens, tempore florum aphyllus" (Spruce), floribus speciosissimis "pulchre coccineis" ad apices ramulorum confertis, calycis tubo 2-3 poll. longo 8-costato, limbo laciniis lanceolatis 1-1½ poll. longis, staminibus styloque valde exsertis.—In Andibus Ecuadorensibus, *Jameson*, *Spruce*. Fortasse varietas speciosa *F. aphyllæ.*

This very handsome species appears to have been first discovered by Jameson in 1836 in the province of Alausi, Ecuador, at an elevation of 10,000 feet, and subsequently, in 1848, near the top of the "Cuesta de Aquas," on the road to Guayaquil. With the specimens from the latter place is a note running thus: "It has no leaves, and its true habitat is on the trunks of old trees covered with moss." Spruce collected it in 1859 in mossy woods on the west side of Mount Azuay. It is very closely allied to *F. apetalæ*, of which it may possibly be a variety; but it has much larger, handsomer flowers with longer sepals and very long exserted stamens. The true *apètala* appears to develope its leaves at the same time as the flowers, and the leaves of the present plant are quite unknown; but it is not absolutely leafless, as the scars of fallen leaves testify.

4. *F. apetala*, Ruiz et Pav. Fl. Peruv. iii., p. 89, t. 322, fig. b.—Frutex epiphytus villosus, cortice verrucoso deciduo, ramis brevibus crassis tortuosis, foliis amplis (ad 6 poll. longis) alternis petiolatis cordato-ovatis subtus præcipue in venis hirsutis, floribus ad apices ramulorum confertis, breviter pedicellatis, calycis tubo 1½-2 poll. longo sursum gradatim expanso 8-costato, limbo laciniis lanceolato-ovatis 6-9 lin. longis, staminibus exsertis, stylo longe exserto.—Peruvia.

The first apetalous species discovered in America. There is no record of its having been in cultivation in this country, but it is stated to have been in Belgian gardens.

5. F. MEMBRANACEA, *n.sp.*—Frutex epiphytus (?) omnino glaberrimus, ramis foliosis teretibus, cortice demum deciduo, foliis petiolatis alternis suboppositis vel ternatis late ovato-lanceolatis ellipticis vel ferè rotundatis acutis minute dentatis tenuibus 2-2½ poll. longis, petiolo gracili 6-9 lin. longo, floribus axillaribus sub-solitariis longe pedicellatis, pedicellis gracilibus ad sesquipollicaribus, calycis tubo 1½-1¾ longo 8-costato sursum gradatim expanso, limbo laciniis lanceolatis acutis 9-12 lin. longis, staminibus inclusis, stylo basi hirsuto.—Caracas, *Linden*, 372, Hb. Kew.

A distinct new species, quite glabrous in all its parts, with small thin leaves on slender petioles and axillary pendent flowers on slender pedicels. The leaves are fully developed when the flowers appear. I have seen only quite young flowers, and therefore the stamens and style may possibly be exserted in fully-expanded flowers.

6. F. SALICIFOLIA, *n.sp.*—Frutex epiphytus omnino nisi flores glaberrimus, ramis foliosis teretibus, cortice persistente, foliis alternis breviter petiolatis anguste lanceolatis acute acuminatis minute et remote denticulatis, subcarnosis, 2½-3½ poll. longis, 9-12 lin. latis, petiolo brevi costaque crasso, floribus pedicellatis axillaribus geminatis vel solitariis leviter pubescentibus roseis, pedicellis 9-12 lin. longis, calycis tubo basi globoso supra basin constricto superne gradatim expanso 8-costato 1½-2 poll. longo, limbo laciniis lanceolatis acutis ad pollicaribus, staminibus inclusis, stylo exserto stigmate clavato.—Sandillani, 7-8000 ped., *R. Pearce*, Hb. Kew.

Another very distinct species, differing remarkably in its foliage from all previously described species. I have only seen specimens gathered by Mr. Pearce, who collected for Messrs. Veitch some years ago.

SOME CONTRIBUTIONS TO PLANT-CHEMISTRY.

By A. H. Church.

(*Continued from vol.* iv., *p.* 172.)

7. *Lactuca sativa.* On submitting some well-grown plants of Cabbage-lettuce to analysis, in order to gain some insight into their chemical composition and dietetic value, the following observations were made. The leaves lost, as might have been predicted, an immense amount of water when dried, first in warm air, and then at 100° C. The dry plant, when burnt in order to obtain its ash, deflagrated owing to the abundance of nitrates present. On this account it was necessary to adopt a special method of ascertaining the amount of albuminoid matter which this plant contains. This was accomplished by determining the nitrogen in a portion of the dried plant which had been treated with a hot solution of carbolic acid. This solution removes other nitrogenous matters, such as nitrates and ammonia salts, but it leaves in an insoluble and coagulated state such nitrogenous matters as are truly albuminoid in their nature. Thus analysed, fresh Lettuces were found to contain, in 100 parts :

Water	95·98
Albuminoids	·71
Starch, Sugar, Gum	1·68
Cellulose and Lignose	·52
Chlorophyll and Fat	·22
Ash	·89
	100·00

8. *Chondrus crispus.* Many conflicting statements have been published as to the occurrence of sulphur-compounds in "Irish Moss." The analyses recently made in my laboratory do not show the nature of the compounds in which the sulphur is contained, but they prove that this element occurs in *Chondrus crispus* in large proportion, and only in part as sulphates. Some of this seaweed which had been carefully picked over and ground to powder was oxidised in the wet-way by means of nitric acid and potassium chlorate; and then the sulphuric acid thus formed was converted into barium sulphate in the usual manner. By this plan it was ascertained that *Chondrus crispus*, in its usual state of moisture as it occurs in commerce, contains no less than 6·41 per cent. of sulphur, although the amount retained in its ash is but 2·64 per. cent. 100 parts of the air-dry plant, freed from impurities by mechanical means, gave the following results on analysis :

Water	18·78
Albuminoids	9·38
Mucilage, &c.	55·54
Cellulose	2·15
Ash	14·15
	100·00

9. *Nasturtium officinale.* I have not been able to find any analysis of the common Watercress. The following data are by no means complete, but they afford fresh evidence of the excessive absorption and assimilation of mineral matter by aquatic and moisture-loving plants. The large amount of ash left on incinerating marine *Algæ*, various species of *Equisetum*, and even the ordinary corn and root crops of the farm in wet seasons, admits of easy explanation: it is interesting to find the Watercress no exception to the rule. Now that it has been proved that the characteristic essential oil of Watercress is not a sulphuretted compound, though it is rich in nitrogen, it is not surprising to find that this plant, in its fresh condition, contains no more than ·082 per cent. of sulphur, an amount which corresponds to 1·195 per cent. in the dry matter of the Watercress. When the albuminoid matter in this plant is estimated by the carbolic process (see paragraph 7 above), the analysis of fresh Watercress stands thus:

Water	93·11
Albuminoids	1·50
Starch, Sugar, Gum, &c. . .	2·92
Cellulose and Lignose . . .	·66
Chlorophyll and Fat . . .	·53
Ash	1·28
	100·00

10. *Fagus sylvatica.* On the 9th of May, 1875, I collected a large quantity of the brown scales (perulæ) from the leaf-buds of the common Beech. The trees were growing on an oolitic soil, and it is right to mention that a part (though I believe but a small one) of the lime found in their ashes might be due to traces of adherent calcareous dust.

My object in examining these scales was to ascertain how far the more valuable elements of nutrition—phosphorus, nitrogen, and potassium—were thrown off by this tree in the form of these protective coverings of its buds. The fallen leaf-scales were found to contain 15·36 per cent. of moisture, while on incineration of the perfectly dry substance 7·70 per cent. of ash was left; the carbonaceous matters thus burnt off contained 0·59 of nitrogen. The ash was further analysed, and was found to contain, in 100 parts:

Lime (CO)	23·60
Potash (K_2O)	5.29
Magnesia (MgO) . . .	4·80
Phosphorus pentoxide (P_2O_5) . .	2·89
Sulphur trioxide (SO_3) . . .	2·09
Silica (SiO_2)	5·62

A better idea of the chemical character of these Beech-scales may be formed by recalculating the above results into a different form. If we take the material in a perfectly dry state, 100 parts will be found to contain:

Carbon, hydrogen, and oxygen	91·71
Nitrogen	.59
Potash	·41
Phosphorus pentoxide	·22
Sulphur trioxide	·17
Silica	·43
Lime and other ash-constituents	6·47
	100·00

It will be seen that the nitrogen, potash, and phosphorus pentoxide together constitute but 1·22 per cent. of the perfectly dry Beech-scales—a result completely in accordance with the nature of the office performed by these organs in the economy of the plant, and with the season of their appearance. They therefore present, in their chemical composition as well as in their physiological rôle, a marked contrast to those parts of plants which are concerned in the process of reproduction.

11. *Ulmus campestris.* This seems an appropriate place to introduce a few observations on the chemical constituents of the female flowers of the Elm. They offer, so far as the proportions of nitrogen, phosphorus, and potassium are concerned, a marked contrast to the Beech-scales discussed in paragraph 10 above. They were collected as they fell from the trees on the 22nd of May, 1875, but, being in different conditions of moistness, it was useless to attempt a determination of the water normally present in them. When perfectly dry they were found to give 8·15 per cent. of ash, while the carbonaceous matters burnt off in obtaining this residue contained no less than 3·31 part, of nitrogen. The ash was further analysed, and was found to contain in 100 parts:

Lime	13·95
Potash	29·27
Phosphorus pentoxide	11·95
Sulphur trioxide	16·39
Silica	5·57

As in the case of the Beech-scales, a clearer idea of the chemical character of the Elm-flowers may be formed by presenting the above results of analysis in a modified form. If we take 100 parts of perfectly dry Elm-flowers, we find them to contain:

Carbon, hydrogen, and oxygen	88·54
Nitrogen	3·31
Potash	2·39
Phosphorus pentoxide	·97
Sulphur trioxide	1·34
Silica	·40
Lime and other ash-constituents	3·05
	100·00

On comparing these numbers with the corresponding figures representing the centesimal composition of Beech-scales, we find that they show a far greater richness in the three more precious elements of plant-nutrition. The nitrogen is here five and a half times as much as in the former case, the potash six times as much, and the phosphorus pentoxide four and a half times as much. I hope on another occasion to secure the data by which an approximative estimate may be made of the relation between the weight of the annual produce of Elm-flowers and that of the leaves of this tree. Such an estimate will afford some insight into the scale on which the movements of nutrient materials both within and without the plant must be continually taking place.

For the analyses included in sections 10 and 11 I am indebted to my pupil, Mr. P. H. Cathcart.

12. *Triticum sativum.* When a grain of Wheat is slightly damped and then carefully peeled, a thin membrane is removed which contains three layers of cells firmly united. The two outer layers are greyish in colour, irregular in structure, and consist mainly of cellulose and lignose, but there is a yellowish and decidedly nitrogenous layer adherent to their inner aspect. We may reasonably assume that the whole of these layers, united together as they are (they are indeed inseparable by mechanical means), make up the pericarp of the caryopsis. Now it is a matter of interest to ascertain how far this pericarp differs in chemical composition from the testa and endopleura, with the strongly-adherent outer row of yellow cells of the endosperm, which is always intimately associated with them. Again, we may compare the pericarp with the embryo from a chemical point of view, and it is about this latter comparison that I propose now to offer some observations.

When perfectly clean specimens of the above-named parts of the Wheat-grain had been secured, their most important constituents were determined to be as follows :—

ANALYSIS OF WHEAT-GRAIN.

	Pericarp.	Embryo.
Water	15·17	12·53
Fat	1·31	4·18
Albuminoids	10·37	35·70
Cellulose and Lignose	70.51	3·12
Starch, Dextrine, &c.		38·71
Ash	2·64	5·76
	100·00	100·00

The above analyses, though far from complete, owing to the difficulty of obtaining sufficient supplies of the materials in a satisfactory condition of purity, show how very different is the chemical composition of these two structures, and how closely it accords with the offices which they have respectively to discharge. Doubtless cellulose and lignose constituted the main portion of the 70·51 per cent. entered as including starch in the analysis of the Wheat pericarp; while there were but 3 per cent. of these materials in the embryos. The oil or fat, which includes cholestorin and matters soluble in ether, was three times as abundant in the embryo as in the pericarp, the former containing moreover three and a half times as much albuminoid matter as the latter. A disproportion in the same direction exists likewise in the ash of the two structures, even when its quantity and not its composition is considered. But fortunately I was able to obtain satisfactory determinations of the phosphorus pentoxide present in the ash both of the pericarp and of the embryo. The ash of the pericarp contained but 15·3 per cent. of P_2O_5, the ash of the embryo no less than 60·58, or four times as much. This concentration of valuable nutrient materials in the embryo of Wheat, though it might have been anticipated, has not, I believe, been previously demonstrated.

SHORT NOTES.

Filago gallica, *L.*—This is, I think, something more than a mere casual in Herts. It is still to be found in at least one locality, a gravelly field to the west of Hertford, where it was first noticed by Messrs. Ansell and Williams some thirty years back; and although, as was the case last season, it is liable to be hoed up when growing amongst the crop, it is able to maintain itself along the adjoining cart-track, where it occurs in some quantity, in company with *F. minima.* The three other species of *Filago* are all to be met with in the same neighbourhood.—R. A. Pryor.

On Iris speculatrix.—The diagnosis* of this pretty species was drawn up from dried specimens communicated by Mr. Charles Ford, which, though nicely prepared, had the flowers quite bleached and rendered uniform in colour by desiccation, and their structure somewhat disguised by the pressure to which they had been subjected. Mr. Ford has since kindly sent me a fine pot of living plants, which bloomed with me for several successive days; and an examination of these enables me to make the following additions and corrections to the original character:—Perigonii tubo 2 lin. longo foliolis subæqualibus obovatis apice emarginatis exterioribus a triente superiore deflexis extus viridulis intus per dimidiam longitudinem albo violaceoque pictis ad duas tertias usque longitudinis cristo simplici ruguloso luteo purpureo-punctato notatis medio macula albida anulo saturate purpureo circumdata ocellatis superne læte purpureis interioribus erectis lilacinis, ovario trigono oblongo, stylis lilacinis lobis erectis perigonii segmentis tertio brevioribus cristis semiovatis acutis extus erosulis, antheris lilacinis lamellula stigmatica parum brevioribus.—H. F. Hance.

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* Trimen, Journ. Bot. n.s. iv., 196.

Extracts and Abstracts.

NEW SPECIES OF PHANEROGAMOUS PLANTS IN PERIODICALS PUBLISHED IN GREAT BRITAIN DURING THE YEAR 1875.

This alphabetical list consists of the new genera and species of Flowering Plants published during 1875 in the following periodicals:—"Botanical Magazine," "Gardener's Chronicle," "Journal of Botany," and "Transactions" and "Journal of the Linnean Society." The numerous new species in Mr. Bentham's monograph of *Mimoseæ* in the Trans. Linn. Soc. (published March, 1875) have not, however, been included. There are also several species considered new, but to which no specific names are attached, in Mr. C. B. Clarke's paper on Indian *Gentianeæ* (Journ. Linn. Soc. xiv., p. 423), and in Mr. Moore's memoir on the plants of Kiukiang (Journ. Bot., 1875, p. 225.).

Actephila rectinervis, *Kurz* (Euphorbiaceæ).—Nicobar Is. (Journ. Bot., p. 329.)

Agasta indica, *Miers* (=*Barringtonia speciosa*, W. & A., non Forst. nec Roxb.) (Barringtoniaceæ).—India, &c. (Trans. Linn. Soc. ser. 2, i., p. 64.)

A. splendida, *Miers.*—Tahiti. (Trans. Linn. Soc. ser. 2, i., p. 60.)

Agave Victoriæ-Reginæ, *T. Moore* (Amaryllidaceæ).—Mexico. (Gard. Chron. ii., p. 484, f. 101.)

Ainsliæa angustifolia, *Hk. f. & Th.* (Compositæ).—Khasia. (Journ. Linn. Soc. xiv., p. 412.)

Albuca (Eualbuca) glandulosa, *Baker* (Liliaceæ).—Cape Colony. (Gard. Chron., p. 814.)

Aloe (Pachidendron) drepanophylla, *Baker* (Liliaceæ).—Cape Colony. (Gard. Chron., p. 814.)

Andrachne maroccana, *Ball* (Euphorbiaceæ).—Morocco. (Journ. Bot., p. 205.)

Anthurium cuspidatum, *Mast.* (Aroideæ).—Columbia. (Gard. Chron. i., p. 428, f. 85.)

A. Patini, *Mast.*—Columbia. (Gard. Chron. i., p. 524, f. 109.)

A. Wallisii, *Mast.*—Columbia. (Gard. Chron. i., p. 429, f. 86.)

Antidesma persimile, *Kurz* (Stilagineæ).—Nicobar Is. (Journ Bot., p. 330.)

Antirrhinum intricatum, *Ball*, subsp. (Scrophulariaceæ).—Morocco. (Journ. Bot., p. 173.)

Antitaxis calocarpa, *Kurz* (Menispermaceæ).—Nicobar Is. (Journ. Bot., p. 324.)

Aporosa glabrifolia, *Kurz* (Euphorbiaceæ).—Nicobar Is. (Journ. Bot., p. 330.)

Areca angusta, *Kurz* (Palmæ).—Nicobar Is. (Journ. Bot., p. 331, and tab. 170.)

Aristolochia (Diplolobus) imbricata, *Mast.* (Aristolochiaceæ.)—Philippines, Cuming 1247. (Journ. Linn. Soc. xiv., p. 494.)

A. (GYMNOLOBUS) PANNOSA, *Mast.*—Peru, Spruce 3901. (Journ. Linn. Soc. xiv., p. 493.)

A. (GYMNOLOBUS) PEARCEI, *Mast.*—Peru. (Journ. Linn. Soc. xiv., p. 493.)

A. (DIPLOLOBUS) UNGULIFOLIA, *Mast.*—Labuan. (Journ. Linn. Soc. xiv., p. 494.)

ARTEMISIA (ABROTANUM) ANOMALA, *S. Moore* (Compositæ).—China. (Journ. Bot., p. 227.)

ARTOCARPUS PEDUNCULARIS, *Kurz* (Artocarpaceæ).—Nicobar Is. (Journ. Bot., p. 331.)

ASPARAGUS BREVIFOLIUS, *Boiss.* (Asparagaceæ).—Lycia. (Journ. Linn. Soc. xiv., p. 602.)

A. BURCHELLII, *Baker.*—Cape Colony, Burch. 2962, Cooper 1574. (Journ. Linn. Soc. xiv., p. 618.)

A. CAPITATUS, *Baker.*—Punjaub, &c. (Journ. Linn. Soc. xiv., p. 607.)

A. CHESNEYI, *Baker.*—Euphrates, Chesney 105 ex parte. (Journ. Linn. Soc. xiv., p. 603.)

A. CUSCUTOIDES, *Burch.*—Cape Colony. (Journ. Linn. Soc. xiv., p. 606.)

A. DENSUS, *Soland.*—Cape Colony. (Journ. Linn. Soc. xiv., p. 616.)

A. DUMOSUS, *Baker.*—Scinde, Stocks 441. (Journ. Linn. Soc. xiv., p. 608.)

A. ECKLONI, *Baker.*—Cape Colony. (Journ. Linn. Soc. xiv., p. 616.)

A. GRIFFITHII, *Baker.*—Affghanistan, Griff. 5856. (Journ. Linn. Soc. xiv., p. 604.)

A. IRREGULARIS, *Baker.*—Zambesi. (Journ. Linn. Soc. xiv., p. 621.)

A. JACQUEMONTI, *Baker.*—India. (Journ. Linn. Soc. xiv., p. 615.)

A. LÆVISSIMUS, *Steud.*—Nilagiri Mts., Wight 2816 (*A. volubilis*, Wall. Cat. 5154 k). (Journ. Linn. Soc. xiv., p. 623.)

A. LOWNEI, *Baker.*—Jericho. (Journ. Linn. Soc. xiv., p. 601.)

A. MACOWANI, *Baker.*—Cape Colony, Zeyher 879, Macowan 1917. (Journ. Linn. Soc. xiv., p. 609.)

A. MONOPHYLLUS, *Baker.*—Beloochistan, Stocks 1114 ex parte. (Journ. Linn. Soc. xiv., p. 604.)

A. MULTIFLORUS, *Baker.*—Cape Colony. (Journ. Linn. Soc. xiv., p. 610.)

A. NEPALENSIS, *Baker* (*A. Curillus*, Wall. Cat., 5155 c).—Nepaul (Journ. Linn. Soc. xiv., p. 622.)

A. NODOSUS, *Soland.*—Cape Colony. (Journ. Linn. Soc. xiv., p. 608.)

A. NELSONI, *Baker.*—Cape Colony. (Journ. Linn. Soc. xiv., p. 617.)

A. OLIGOPHYLLUS, *Baker.*—Astrachan. (Journ. Linn. Soc. xiv., p. 604.)

A. OXYACANTHUS, *Baker.*—Cape Colony. (Journ. Linn. Soc. xiv., p. 625.)

A. PALÆSTINUS, *Baker.*—Palestine. (Journ. Linn. Soc. xiv., p. 602.)

A. PERSICUS, *Baker.*—Persia, Kotschy 365. (Journ. Linn. Soc. xiv., p. 603.)

A. PILOSUS, *Baker.*—Trop. Africa. (Journ. Linn. Soc. xiv., p. 610.)

A. PLUMOSUS, *Baker*.—Cape Colony, Drège 4482, Cooper 202. (Journ. Linn. Soc. xiv., p. 613.)

A. PUBERULUS, *Baker*.—Zambesi. (Journ. Linn. Soc. xiv., p. 618.)

A. RAMOSISSIMUS, *Baker*.—Cape Colony. (Journ. Linn. Soc. xiv., p. 622.)

A. ROTTLERI, *Baker*.—India. (Journ. Linn. Soc. xiv:, p. 611.)

A. SCHWEINFURTHII, *Baker* (*A. abyssinicus*, Schweinf. non Hochst.).—Abyssinia, Schw. Gallab. 29. (Journ. Linn. Soc. xiv., p. 16.)

A. SIMULARIS, *Baker*.—Madagascar, Gerard 66. (Journ. Linn. Soc. xiv., p. 619.)

A. STELLATUS, *Baker*.—Cape Colony, Drège 8589, Cooper 622. Journ. Linn. Soc. xiv., p. 612.)

A. SUBULATUS, *Steud.* (*A. asiaticus*, Wight non L.).—Nilagiri Mts., Wight 2818. (Journ. Linn. Soc. xiv., p. 614.)

A. VAGINELLATUS, *Bojer*.—Madagascar. (Journ. Linn. Soc. xiv., p. 612.)

A. ZANZIBARICUS, *Baker*.—Zanzibar, Hildebrandt 1048. (Journ. Linn. Soc. xiv., p. 614.)

ASYSTASIA CHINENSIS, *S. Moore* (Acanthaceæ).—China. (Journ. Bot., p. 229.)

AUXEMMA, *Miers* (Cordiaceæ); *A. Gardneriana*, Miers.—Brazil, Gardner 1779. (Trans. Linn. Soc. ser. 2, i., p. 24.)

BATEMANNIA ARMILLATA, *Rchb. f.*, Hort. Bot. Hamburg. (Orchideæ.) (Gard. Chron., p. 780.)

BERCHEMIA CONGESTA, *S. Moore* (Rhamnaceæ).—China. (Journ. Bot., p. 226.)

*BIXAGREWIA, *Kurz* (Tiliaceæ); *B. nicobarica*, Kurz.—Nicobar Is. (Journ. Bot., p. 325, and tab. 160.)

BOERHAAVIA MAROCCANA, *Ball* (Amarantaceæ).—Morocco. (Journ. Bot., p. 177.)

BOSCHIA ACUTIFOLIA, *Mast.* (Malvaceæ).—Borneo, Beccari 765, 237 ?, 2600. (Journ. Linn. Soc. xiv., p. 503.)

B. GRANDIFLORA, *Mast.*—Borneo, Beccari 1620. (Journ. Linn. Soc. xiv., p. 502.)

BRACHYPODIUM CHINENSE, *S. Moore* (Gramineæ).—China. (Journ. Bot., p. 230.)

BUNGEA SHEARERI, *S. Moore* (Scrophulariaceæ).—China. (Journ. Bot., p. 229.)

BUTONICA ALATA, *Miers* (Barringtoniaceæ).—Malacca. (Trans. Linn. Soc. ser. 2, i., p. 70.)

B. APICULATA, *Miers*.—Madagascar. (Trans. Linn. Soc. ser. 2, i., p. 78.)

B. CAFFRA, *Miers* (*Barringtonia racemosa*, Oliv. non Bl.).—S. Africa. (Trans. Linn. Soc. ser. 2, i., p. 78.)

B. INCLYTA, *Miers*.—Malacca. (Trans. Linn. Soc. ser. 2, i., p. 72.)

B. PROCERA, *Miers*.—Pacific Is. (Trans. Linn. Soc. ser. 2, i., p. 74.)

CALAMINTHA ATLANTICA, *Ball*, subsp. (Labiatæ).—Morocco. (Journ. Bot., p. 175.)

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* This is *Trichospermum*, Blume (see Journ. Bot., p. 373.)

Calamus (Eucalamus, Loriferi) tetradactylus, *Hance* (Palmæ.)—Hongkong. (Journ. Bot., p. 289.)

Calathea leucostachys, *Hook. f.* (Cannaceæ).—Costa Rica. (Bot. Mag., t. 6205.)

Calochortus citrinus, *Baker* (Liliaceæ).—California (Bot. Mag., t. 6200.)

Campylandra, *Baker* (Asparagaceæ); *C. aurantiaca*, Baker (= *Tupistra ? aurantiaca*, Wall. Cat. 5194).—Sikkim, Griffith 5886, 5888. (Journ. Linn. Soc. xiv., p. 582, t. 20.)

Canscora andrographioides, *Griffith* (Gentianaceæ). — Khasia. (Journ. Linn. Soc. xiv., p. 431.)

Carex fissirostris, *Ball* (Cyperaceæ).—Morocco. (Journ. Bot., p. 206.)

Careya orbiculata, *Miers* (Barringtoniaceæ).—Burmah. (Trans. Linn. Soc. ser. 2, i, p. 98.)

Carica candamarcensis, *Hort. Belg.* (Papayaceæ).—Ecuador. (Bot. Mag., t. 6198.)

Castanopsis (Eucastanopsis) Falconeri, *Hance* (Cupuliferæ).—Tenasserim. (Journ. Bot., p. 368.)

C. (Callæocarpus) Lamontii, *Hance.*—Hongkong. (Journ. Bot., p. 368.)

C. (Callæocarpus) Pierrei, *Hance.*—Cambodia. (Journ. Bot., p. 369.)

C. (Eucastanopsis) tibetana, *Hance.*—China. (Journ. Bot., p. 367.)

Celsia maroccana, *Ball* (Scrophulariaceæ).—Morocco. (Journ. Bot., p. 172.)

Champereya gnetocarpa, *Kurz* (Olacineæ).—Nicobar Is. (Journ. Bot., p. 325.)

Cohnia neocaledonica (Asparagaceæ).—New Caledonia, Vieillard 1388. (Journ. Linn. Soc. xiv., p. 546.)

Corydalis gracilipes, *S. Moore* (Fumariaceæ).—China. (Journ. Bot., p. 226.)

C. (Capnites) Sheareri, *S. Moore.*—China. (Journ. Bot., p. 225.)

Crassula Bolusii, *Hook. f.* (Crassulaceæ).—Cape Colony. (Bot. Mag., t. 6194.)

Crawfurdia (Tripterospermum) luteo-viridis, *Clarke* (Gentianaceæ).—Himalaya. (Journ. Linn. Soc. xiv., p. 443.)

C. (Dipterospermum) puberula, *Clarke.*—Sikkim. (Journ. Linn. Soc. xiv., p. 442.)

Crocus Crewei, *Hook. f.* (Irideæ).—Greek Archipelago. (Bot. Mag., t. 6168.)

Cyclostemon leiocarpum, *Kurz* (Euphorbiaceæ).— Nicobar Is. (Journ. Bot., p. 330.)

Cyrtanthus (Monella) Macowani, *Baker* (Amaryllidaceæ).—Cape Colony. (Gard. Chron. ii., p. 98.)

Decabelone Barklyi, *Dyer* (Asclepiadaceæ).—Little Namaqualand. (Bot. Mag., t. 6203.)

Dendrobium (Dendrocoryne) Brymerianum, *Rchb. f.* (Orchideæ).—Burmah. (Gard. Chron. ii., p. 323.)

D. floribundum, *Rchb. f.*—New Hebrides. (Gard. Chron. ii., p. 772.)

D. MARMORATUM, *Rchb. f.*—Burmah. (Gard. Chron. i., p. 492.)

D. RHODOPTERYGIUM, *Rchb. f.*—Moulmein. (Gard. Chron. i., p. 684.)

D. TRICHOSTOMUM, *Rchb. f.*—New Guinea. (Journ. Linn. Soc. xv., p. 30.)

DIALYCARPA, *Mast.* (Malvaceæ, Durioneæ); *D. Beccarii*, Mast.—Borneo, Beccari 2473. (Journ. Linn. Soc. xiv., p. 505.)

DIANELLA HOOKERI, *Baker* (=*D. lævis*, Hook. f. non R.Br.) (Asparagaceæ).—Tasmania. (Journ. Linn. Soc. xiv., p. 576.)

DICHORISANDRA SAUNDERSII, *Hook. f.* (Commelynaceæ). — Brazil. (Bot. Mag., t. 6165.)

DIDYMOCARPUS AURICULA, *S. Moore* (Cyrtandraceæ).—China. (Journ. Bot., p. 229.)

DIETES HUTTONI, *Baker* (Iridaceæ).—Cape Colony. (Bot. Mag. t. 6174.)

DIOSPYROS DIVERSIFOLIA, *Hiern* (Ebenaceæ).—Rodriguez. (Journ. Bot., p. 353, and tab. 172.)

DISPORUM UNIFLORUM, *Baker* (Asparagaceæ).—China. (Journ. Bot., p. 230.)

DOXOMMA MACROSTACHYUM, *Miers* (Barringtoniaceæ).—Penang and Borneo, Beccari 1535. (Trans. Linn. Soc. ser. 2, i., p. 98.)

D. MAGNIFICUM, *Miers.*—Tavoy. (Trans. Linn. Soc. ser. 2, i., p. 106.)

D. RIGIDUM, *Miers.*—Malaya, Maingay 797, 2496. (Trans. Linn. Soc. ser. 2, i., p. 104.)

DRABA (AIROPSIS) MAWII, *Hook. f.* (Crucifereæ). — Spain. (Bot. Mag., t. 6186.)

DRACÆNA CINCTA, *Baker* (Asparagaceæ), Hort. Bull.—(Journ. Linn. Soc. xiv., p. 530.)

D. SMITHII, *Baker.*—Tropical Africa. (Bot. Mag., t. 6169.)

DRIMIA (?) HAWORTHIOIDES, *Baker* (Liliaceæ).—Cape Colony. (Gard. Chron., p. 366, f. 70.)

DRYMOPHILA MOOREI, *Baker* (Asparagaceæ).—Australia. (Journ. Linn. Soc. xiv., p. 571.)

DURIO CARINATUS, *Mast.* (Malvaceæ).—Borneo, Beccari 600, 2688, 4019. (Journ. Linn. Soc. xiv., p. 500.)

D. LANCEOLATUS, *Mast.*—Borneo, Beccari 2610. (Journ. Linn. Soc. xiv., p. 499.)

D. LISSOCARPUS, *Mast.*—Borneo, Beccari 427. (Journ. Linn. Soc. xiv., p. 501.)

D. OBLONGUS, *Mast.*—Borneo, Beccari 616, 855, 1204, 2921, 3088. (Journ. Linn. Soc. xiv., p. 500.)

EMBELIA MICROCALYX, *Kurz* (Mysineæ).—Nicobar Is. (Journ. Bot., p. 328.)

EPIDENDRUM SYRINGOTHYRSIS, *Rchb. f.* (Orchideæ).—Bolivia. (Bot. Mag., t. 6145.)

E. (sect. nov. ACROPLEURANTHIUM) WALLISII.—New Grenada. (Gard. Chron. i., p. 66.)

ERIOSPERMUM ALBUCOIDES, *Baker* (Liliaceæ).—Cape Colony. (Gard. Chron. i., p. 716.)

E. CALCARATUM, *Baker.*—Cape Colony. (Gard. Chron i., p. 716.)

Erythrotis, *Hook. f.* (Commelynaceæ); *E. Beddomei*, Hook. f.—Travancore. (Bot. Mag., t. 6150.)

Euphorbia inconspicua, *Ball* (Euphorbiaceæ).—Morocco. (Journ. Bot., p. 205.)

E. megalatlantica, *Ball.*—Morocco. (Journ. Bot., p. 205.)

Exacum Beddomei, *Clarke* (Gentianaceæ).—Pulney, India. (Journ. Linn. Soc. xiv., p. 427.)

Fritillaria (Amblirion) dasyphylla, *Baker* (Liliaceæ).—Asia Minor. (Gard. Chron., p. 653.)

F. (Monocodon) macrandra, *Baker.*—Island of Syra. (Gard. Chron., p. 715.)

Galanthus Elwesii, *Hook. f.* (Amaryllidaceæ).—Asia Minor. (Bot. Mag., t. 6166.)

Garcinia calycina, *Kurz* (Guttiferæ).—Nicobar Is. (Journ. Bot., p. 324.)

G. Hanburyi, *Hook. f.* (=*G. Morella*, Desr., var. *pedicellata*, Hanbury).—Singapore, cult (Journ. Linn. Soc. xiv., p. 485.)

G. microstigma, *Kurz.*—Andaman Is. (Journ. Bot., p. 324.)

Gentiana Andersoni, *Clarke* (Gentianaceæ).—Sikkim. (Journ. Linn. Soc. xiv., p. 436.)

G. crassa, *Kurz.*—Burmah. (Journ. Linn. Soc. xiv., p. 440.)

G. Falconeri, *Clarke.*—Himalaya. (Journ. Linn. Soc. xiv., p. 433.)

G. nudicaulis, *Kurz.*—Khasia and Burmah. (Journ. Linn. Soc. xiv., p. 437.)

G. Stoliczka, *Herb. Kurz.*—Himalaya. (Journ. Linn. Soc. xiv., p. 433.)

Gladiolus Cooperi, *Baker* (Iridaceæ).—Cape Colony and Natal. (Bot. Mag., t. 6202.)

Glochidion calocarpum, *Kurz* (Euphorbiaceæ).—Nicobar Is. (Journ. Bot., p. 330.)

Gnetum macropodum, *Kurz* (Gnetaceæ).—Nicobar Is. (Journ. Bot., p. 331.)

Gonioscypha, *Baker* (Asparagaceæ); *G. eucomoides*, Baker.—Bootan. (Journ. Linn. Soc. xiv., p. 581, tab. 19.)

Hedyotis graminicola, *Kurz* (Rubiaceæ).—Nicobar Is. (Journ. Bot., p. 326.)

Henslowia erythrocarpa, *Kurz* (Santalaceæ).—Nicobar Is. (Journ. Bot., p. 329.)

Hymenesthes, *Miers* (Cordiaceæ); *H. nitida*, Miers (*Bourreria succulenta*, Wright non Jacq.).—Cuba, Wright 3119. (Trans. Linn. Soc. ser. 2, i., p. 26.)

Iris (Pogoniris) rubro-marginata, *Baker* (Irideæ).—Scutari. (Gard. Chron. i., p. 524.)

I. (Eremiris) speculatrix, *Hance.*—Hongkong. (Journ. Bot., p. 196.)

Ixora macrosiphon, *Kurz* (Rubiaceæ).—Andaman Is. (Journ. Bot., p. 327.)

Jæschkea latisepala, *Clarke* (Gentianaceæ).—Himalaya. (Journ. Linn. Soc. xiv., p. 441.)

Jasminum subglandulosum, *Kurz* (Oleaceæ).—Andaman Is. (Journ. Bot., p. 329.)

Lasianthus lævicaulis, *Kurz* (Rubiaceæ).—Nicobar Is. (Journ. Bot., p. 327.)

L. plagiophyllus, *Hance*.—Hongkong. (Journ. Bot., p. 196.)

Leea grandifolia, *Kurz* (Vitaceæ).—Nicobar Is. (Journ. Bot., p. 325.)

Linaria galioides, *Ball* (Scrophulariaceæ).—Morocco. (Journ. Bot., p. 173.)

L. lurida, *Ball*.—Morocco. (Journ. Bot., p. 173.)

Marrubium echinatum, *Ball* (Labiatæ).—Morocco. (Journ. Bot., p. 175.)

Masdevallia (Fenestratæ) gracilenta, *Rchb. f.* (Orchideæ).—Costa Rica. (Gard. Chron. i., p. 98.)

M. Gustavi, *Rchb. f.*—New Grenada. (Gard. Chron. i., p. 461.)

M. heteroptera, *Rchb. f.*—Medellin. (Gard. Chron. i., p. 590.)

M. ionocharis, *Rchb. f.*—Peru. (Gard. Chron. ii., p. 388.)

M. Melanopus, *Rchb. f.*—Hort. Fürstenberg. (Gard. Chron., p. 136.)

M. melanoxantha, *Rchb. f.*—New Grenada. (Gard. Chron. ii., p. 580.).

M. muscosa, *Rchb. f.*—New Grenada. (Gard. Chron. i., p. 460.)

M. polysticta, *Rchb. f.* (Gard. Chron. i., p. 40.)

M. Reichenbachiana, *Endr.*—Costa Rica. (Gard. Chron. ii., p. 257.)

M. (Saccilabiatæ) severa, *Rchb. f.*—Columbia. (Gard. Chron., p. 170.)

M. Shuttleworthii, *Rchb. f.*—Columbia. (Gard. Chron. i., p. 170.)

M. simula, *Rchb. f.*—New Grenada. (Gard. Chron. i., p. 8.)

M. spectrum, *Rchb. f.*—New Grenada. (Gard. Chron. i., p. 429.)

M. velutina, *Rchb. f.*—New Grenada. (Gard. Chron. ii., p. 420.)

Megaclinium melanorrhachis, *Rchb. f.* (Orchideæ).—Sierra Leone. (Gard. Chron. ii., p. 162.)

Megadendron pallidum, *Miers* (Barringtoniaceæ).—Java. (Trans. Linn. Soc. ser. 2, i., p. 100.)

Milla (Eu-milla) Leichtlinii, *Baker* (Liliaceæ). — Southern Andes. (Gard. Chron., p. 234.)

Modecca nicobarica, *Kurz* (Passifloreæ).—Nicobar Is. (Journ. Bot., p. 326.)

Napoleona angolensis, *Welw.*—Angola. (Trans. Linn. Soc. ser. 2, i., p. 12.)

N. cuspidata, *Miers*.—Old Calabar, Mann 2272. (Trans. Linn. Soc. ser. 2, i., p. 11.)

N. Mannii, *Miers*.—Fernando Po, Mann 590. (Trans. Linn. Soc. ser. 2, i., p. 11.)

Neesia strigosa, *Mast.* (Malvaceæ).—Borneo, Beccari 2037, 3253. (Journ. Linn. Soc. xiv., p. 504.)

Neodryas densiflora, *Rchb. f.* (Orchideæ). (Gard. Chron. i., p. 492.)

Nepeta atlantica, *Ball* (Labiateæ).—Morocco. (Journ. Bot., p. 175.)

Odontoglossum compactum, *Rchb. f.* (Orchideæ).—New Grenada. Gard. Chron. i., p. 492.)

O. prænitens, *Rchb. f.*—New Grenada. (Gard. Chron. i., p. 524.)

O. TETRAPLASIUM, *Rchb. f.*—Peru. (Gard. Chron. i., p. 558.)

O. WEIRII, *Rchb. f.*—New Grenada. (Gard. Chron. i., p. 461.)

OMPHALOCARPUM ELATUM, *Miers* (*O. procerum*, Oliv. non Beauv.).—Africa Trop. (Trans. Linn. Soc. ser. 2, i., p. 16.)

ONCIDIUM ANNULARE, *Rchb. f.* (Orchideæ).—New Grenada. (Gard. Chron., p. 396.)

O. CORDERI, *Rchb. f.*—(Gard. Chron. i., p. 748.)

O. DACTYLOPTERUM, *Rchb. f.*—Oçana. (Gard. Chron. i., p. 684.)

O. HEBRAICUM, *Rchb. f.*—New Grenada. (Gard. Chron. i., p. 780.)

O. ROSTRANS, *Rchb. f.*—(Gard Chron. i., p. 748.)

O. TECTUM, *Rchb. f.*—New Grenada. (Gard. Chron. i., p. 780.)

OPHELIA MACROSPERMA, *Hort. Calcutt.* (Gentianaceæ).—Khasia. (Journ. Linn. Soc. xiv., p. 448.)

ORANIA (VEITCHIA) NICOBARICA, *Kurz* (Palmæ).—Nicobar Is. (Journ. Bot., p. 331, and tab. 171.)

ORNITHOCEPHALOCHLOA, *Kurz* (Gramineæ); *O. arenicola*, Kurz.—Nicobar Is. (Journ. Bot., p. 332, and tab. 171.)

ORNITHOGALUM (CATHISSA) CHLORANTHUM, *Baker* (Liliaceæ).—Cape Colony. (Gard. Chron. ii., p. 323.)

O. (HELIOCHARMOS) GLAUCOPHYLLUM, *Baker.*—Asia Minor. (Gard. Chron. ii., p. 36.)

OROPHEA KATCHALLICA, *Kurz* (Anonaceæ).—Nicobar Is. (Journ. Bot., p. 323.)

PANDANUS UROPHYLLUS, *Hance* (Pandanaceæ).—Hongkong. (Journ. Bot., p. 68.)

PARONYCHIA MACROSEPALA, *Ball* (Paronychiaceæ).—Morocco. (Journ. Bot., p. 204.)

PATAGONULA GLABRA, *Miers* (Cordiaceæ).—Brazil. (Trans. Linn. Soc. ser. 2, i., p. 29.)

P. TWEEDIANA, *Miers.*—Brazil. (Trans. Linn. Soc. ser. 2., i., p. 29.)

PELLIONIA PROCRIDIFOLIA, *Kurz.*—Nicobar Is. (Journ. Bot., p. 330.)

PENTAPHRAGMA MACROPHYLLA, *Oliv.*—New Guinea. (Journ. Linn. Soc. xv., p. 29.)

PESCATOREA LAMELLOSA, *Rchb. f.* (Orchideæ).—New Grenada. (Gard. Chron. ii., p. 225.)

PHÆDRANASSA (ODONTOPUS) RUBRO-VIRIDIS, *Baker* (Amaryllidaceæ).—Origin unknown. (Gard. Chron. ii., p. 7.)

PHALÆNOPSIS CASTA, *Rchb. f.* (Orchideæ).—(Gard. Chron. i., p. 590.)

P. LEUCORRHODA, *Rchb. f.* (Orchideæ).—Philippines. (Gard. Chron. i., p. 301, 366.)

PHLYARODOXA (Verbenaceæ); *P. leucantha*, S. Moore.—China. (Journ. Bot., p. 229.)

PIPTOCARPHA PANNOSA, *Baker* (Compositæ).—Brazil, Glaziou 7625. (Journ. Bot., p. 203.)

P. TOMENTOSA, *Baker.*—Brazil, Glaziou 7719. (Journ. Bot., p. 203.)

PLANCHONIA CRENATA, *Miers* (Barringtoniaceæ).—Australia. (Trans. Linn. Soc. ser. 2, i., p. 91.)

P. ELLIPTICA, *Miers.*—Borneo, Motley 750. (Trans. Linn. Soc. ser. 2, i., p. 94.)

Pleurothallis fulgens, *Rchb. f.* (Orchideæ).—Costa Rica. (Gard. Chron. ii., p. 516.)

Polygonatum brevistylum, *Baker* (Asparagaceæ).—Sikkim. (Journ. Linn. Soc. xiv., p. 556.)

P. Cathcartii, *Baker.*—Sikkim, Hook. f. & Th. n. 3. (Journ. Linn. Soc. xiv., p. 559.)

P. Griffithii, *Baker.*—Himalaya, Griffith 5846. (Journ. Linn. Soc. xiv., p. 558.)

P. Hookeri, *Baker.*—Sikkim. Hook. f. & Th. n. 8. (Journ. Linn. Soc. xiv., p. 558.)

P. Maximowiczii, *F. Schmidt.*—Sachalin. (Journ. Linn. Soc. xiv., p. 556.)

P. nervulosum, *Baker.* — Sikkim and Bhotan, Griffith 5850. (Journ. Linn. Soc. xiv., p. 557.)

P. umbellatum, *Baker.*—N. China. (Journ. Linn. Soc. xiv., p. 553.)

Popowia parvifolia, *Kurz* (Anonaceæ).—Nicobar Is. (Journ. Bot., p. 324.)

Primula (Arthritica) oreocharis, *Hance.*—N. China. (Journ. Bot., p. 133.)

Psychotra andamanica, *Kurz* (Rubiaceæ).—Andaman and Nicobar Is. (Journ. Bot., p. 328.)

P. nicobarica, *Kurz.*—Nicobar Is. (Journ. Bot., p. 328.)

P. platyneura, *Kurz.*—Andaman Is. (Journ. Bot., p. 327.)

P. polyneura, *Kurz.*—Andaman Is. (Journ. Bot., p. 327.)

P. tylophora, *Kurz.*—Nicobar Is. (Journ. Bot., p. 328.)

Pyrus (Sorbus) pohuashanensis, *Hance* (Rosaceæ).—N. China. (Journ. Bot., p. 132.)

Quercus (Cyclobalanus) elephantum, *Hance* (Cupuliferæ).—Cambodia. (Journ. Bot., p. 365.)

Q. (Pasania) farinulenta, *Hance.*—Cambodia. (Journ. Bot., p 365.)

Q. (Cerris, Erythrobalanopsis) Moulei, *Hance.*—China. (Journ. Bot., p. 363.)

Restrepia Dayana, *Rchb. f.* (Orchideæ).—Costa Rica. (Gard. Chron. ii., p. 258.)

R. Reichenbachiana, *Endres.*—Costa Rica. (Gard. Chron. ii., p. 356.)

Ribes (Ribesia) chifuense, *Hance* (Grossulariaceæ).—Shantung, China. (Journ. Bot., p. 36.)

R. (Grossularia) macrocalyx, *Hance.*—China. (Journ. Bot., p. 35.)

Rubus innominatus, *S. Moore* (Rosaceæ).—China. (Journ. Bot., p. 226.)

Saccolabrium dives, *Rchb. f.* (Orchideæ).—Hort. Bull. (Gard. Chron. ii., p. 131.)

S. Hendersonianum, *Rchb. f.*—Borneo. (Gard. Chron. ii., p. 356.)

S. pumilio, *Rchb. f.*—Manila. (Gard. Chron. ii., p. 98.)

Sagina melitensis, *Gulia* (Caryophyllaceæ).—Malta. (Journ. Bot., p. 37.)

Salix Sadleri, *Syme* (Salicineæ).—Scotland. (Journ. Bot., p. 33, and tab. 158.)

Salvia maurorum, *Ball,* subsp. (Labiatæ).—Morocco. (Journ. Bot., p. 175.)

Sanicula orthoacantha, *S. Moore* (Umbelliferæ).—China. (Journ. Bot., p. 227.)

Sansevieria Ehrenbergii, *Schweinf.* (Asparagaceæ).—Nubia, Schw. Pl. Nub. Exsicc. 1865, n. 31. (Journ. Linn. Soc. xiv., p. 549.)

S. nilotica, *Baker.*—Nubia. (Journ. Linn. Soc. xiv., p. 548.)

S. senegambica, *Baker.*—Senegal, Perrott 76, 782. (Journ. Linn. Soc. xiv., p. 548.)

Scilla (Ledebouria) Macowani, *Baker* (Liliaceæ).—Cape Colony. (Gard. Chron. i., p. 748.)

Scutellaria (Stachymacris) sciaphila, *S. Moore* (Labiatæ).—China. (Journ. Bot., p. 228.)

Sebæa Khasiana, *Clarke* (Gentianaceæ).—Khasia. (Journ. Linn. Soc. xiv., p. 428.)

Sedum Millii, *Baker* (Crassulaceæ).—Anatolia. (Journ. Bot., p. 236.)

S. Sheareri, *S. Moore* (Crassulaceæ).—China. (Journ. Bot., p. 227.)

Senecio (Cacalia) rubescens, *S. Moore* (Compositæ).—China. (Journ. Bot., p. 228.)

Serratula chinensis, *S. Moore* (Compositæ).—China. (Journ. Bot. p. 228.)

Sheareria, S. Moore (Compositæ juxta *Rhynchospermum*); *S. nana.* —China. (Journ. Bot., p. 227 and tab. 365.)

Speirantha, *Baker* (Asparagaceæ); *S. convallarioides,* Baker (=*Albuca? Gardeni,* Hook. Bot. Mag., t. 4842).—China. (Journ. Linn. Soc. xiv., p. 561, and tab. 17.)

Stapelia (Tridentea?) olivacea, *N. E. Brown* (Asclepiadeæ).—Cape of Good Hope. (Gard. Chron. i., p. 136 and f. 24.)

Statice læta, *Ball* (Plumbaginaceæ).—Morocco. (Journ. Bot., p. 176.)

Stenospermatium Wallisii, *Mast.* (Myrtaceæ).—Columbia. (Gard. Chron. i., p. 558, f. 116, 7.)

Stephania ? tetrandra, *S. Moore* (Menispermaceæ).—China. (Journ. Bot., p. 225.)

Stephanolirion, *Baker* (Liliaceæ, Milleæ); *S. narcissoides, Baker.* —Chili. (Gard. Chron. i., p. 234.)

Steudnera discolor, *Hort. Bull.* (Aroideæ).—India ? (Gard. Chron. ii., p. 708.)

Stipa nitens, *Ball,* subsp. (Gramineæ).— Morocco. (Journ. Bot., p. 206.)

Stravadium demissum, *Miers* (Barringtoniaceæ).—Malay Is. and Peninsula, Griffith 74, 2425; Wall. Cat. 3634 a,c,d. (Trans. Linn. Soc. ser. 2, i., p. 81.)

S. denticulatum, *Miers.*—Australia. (Trans. Linn. Soc. ser. 2, i., p. 88.)

S. gracile, *Miers* (*Barringtonia acutangula,* Benth. non Gaertn.) —Australia. (Trans. Linn. Soc. ser. 2, i., p. 86.)

S. pubescens, *Miers.*—India, Wight 1062, 1063, 1080; Wall. Cat. 3635 b. (Trans. Linn. Soc. ser. 2, i., p. 83.)

S. SEMISUTUM, *Miers*.—Samoa. (Trans. Linn. Soc. ser. 2, i., p. 89.)

STREPTOPUS ? BREVIPES, *Baker* (Asparagaceæ).—Oregon. (Journ. Linn. Soc. xiv., p. 592.)

[*]TETRAMERISTA PANICULATA, *Kurz* (Ochnaceæ).—Malaya, Maingay 290. (Journ. Bot., p. 333.)

THYMUS MAROCCANUS, *Ball* (Labiatæ).—Morocco. (Journ. Bot., p. 174.)

TOVARIA LAXIFLORA, *Baker* (Asparagaceæ).—Guatemala. (Journ. Linn. Soc. xiv., p. 569.)

T. NERVULOSA, *Baker*.—Mexico. (Journ. Linn. Soc. xiv., p. 569.)

T. OLERACEA, *Baker*.—Sikkim, Griffith 5853. (Journ. Linn. Soc. xiv., p. 569.)

T. OLIGOPHYLLA.—Sikkim. (Journ. Linn. Soc. xiv., p. 565.)

T. SALVINI, *Baker*.—Guatemala. (Journ. Linn. Soc. xiv., p. 567.)

T. SESSILIFOLIA, *Baker*.—Western N. America. (Journ. Linn. Soc. xiv., p. 566.)

T. THYRSOIDEA, *Baker*.—Mexico, Jurgensen 773, 939; Brotero 914; Botteri 138. (Journ. Linn. Soc. xiv., p. 568.)

TULIPA (ORITHYIA) ERYTHRONIOIDES, *Baker* (Liliaceæ).—China. (Journ. Bot., p. 292.)

T. (ORITHYIA) GRAMINIFOLIA, *Baker*.—China. (Journ. Bot., p. 230.)

VERBASCUM CALYCINUM, *Ball* (Scrophulariaceæ). — Morocco (Journ. Bot., p. 172.)

VERNONIA CONDENSATA, *Baker* (Compositæ).—Brazil, Glaziou 7705. (Journ. Bot., p. 202.)

VERONICA ATLANTICA, *Ball*, subsp. (Scrophulariaceæ).—Morocco. (Journ. Bot., p. 174.)

VINCETOXICUM CHINENSE, *S. Moore* (Asclepiadeæ).—China. (Journ. Bot., p. 228.)

XEROPHYTA CLAVATA, *Baker* (Vellozieæ).—Natal. (Journ. Bot., p. 233.)

X. DASYLIRIOIDES, *Baker*.—Madagascar. (Journ. Bot., p. 235.)

X. EQUISETOIDES, *Baker*.—Trop. Africa. (Journ. Bot., p. 233.)

X. MELLERI, *Baker*.—Trop. Africa. (Journ. Bot., p. 234.)

X. MINUTA, *Baker*.—Natal. (Journ. Bot., p. 234.)

X. RETINERVIS, *Baker*.—Cape Colony, Zeyher 1672. (Journ. Bot., p. 233.)

X. SPEKEI, *Baker*.—Trop. Africa. (Journ. Bot., p. 234.)

X. VISCOSA, *Baker*.—South Africa. (Journ. Bot., p. 235.)

XIPHION (JUNO) AITCHISONI, *Baker* (Iridaceæ).—Punjaub. (Journ. Bot., p. 108.)

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[*] This is *Tetractomia majus*, Hook. f. Fl. Ind. i., p. 491.

Notices of Books.

Beiträge zur Biologie der Pflanzen, herausgegeben von Dr. FERDINAND COHN. Drittes Heft. (Contributions to Vegetable Biology, edited by Dr. F. Cohn.)

THE third part, completing the first volume, of this work, which is entirely devoted to vegetable biology, contains an interesting series of articles by various contributors. The first is by Dr. Schroeter, on the development of some of the Rust Fungi. The cycle of the alternation of generations, or different stages in the development, of *Puccinia graminis* are very well known, although no sexual organs have been observed. Dr. Schroeter's investigations refer to the common *Uredo* found on *Carex hirta*, which he regards as *Puccinia Caricis*, DC. A number of careful experiments have led him to the belief that he has discovered in *Œcidium Urticæ*, Schum., a fruiting form of *Puccinia Caricis*. A second set of observations relate to a common form of *Uromyces* found on a variety of Grasses. The *Uredo* of this Fungus has been described as *Epitea Poæ*, Tul., and *E. Dactylidis*, Otth.; its teleutospores as *Uromyces Dactylidis*, Otth., *Capitularia graminis*, Niessl., *Uromyces graminum*, Cooke, and *Puccinella graminis*, Fckl. Dr. Schroeter designates this Fungus (in all its states) as *Uromyces Dactylidis*, not having been able to detect any differences between that growing on *Poa* and that on *Dactylis* and other Grasses, either in the *Epitea* or in the *Uromyces*. He thinks there is no doubt from his own observations that *Œcidium Ranunculacearum*, at least as it appears on *Ranunculus bulbosus* and *R. repens*, belongs to the cycle of the different stages of development of *Uromyces Dactylidis*. Further, perhaps the forms found on *R. acris*, *polyanthemos*, *auricomus*, and *lanuginosus* should also be referred here.—Dr. Just contributes the results of some investigations on the resistance to evaporation offered by the epidermal tissues. Pared and unpared Apples were used in the experiments. Without describing his mode of procedure, the results may be briefly stated as follows, temperature being the only agent taken into consideration. At relatively low temperatures the evaporation from the unpared Apples was very slight. Thus at 21° C. it only amounted to 3·322 grammes in ninety-six hours, against 44·24 grammes per square decimeter during the same period from the pared Apples. At a very high temperature, 97° C., the evaporation from the pared and unpared Apples was within a quarter of a gramme of being equal for the ninety-six hours; the unpared giving off 73·89 and the pared 73·67 grammes per square decimeter. The greatest amount of evaporation from the pared surface was 46° C., at which temperature it reached 85·86 grammes per square decimeter. Above and below this point there was an almost uniform decrease in evaporation. The greatest amount of evaporation from the unpared surface was 78·11 grammes per square decimeter at 83° C. The duration of all the experiments, and there were eleven pairs, was the same, and the weights were taken every twenty-four hours.—The third paper is by Dr. Schroeter, and is entitled "A test of some disinfecting substances by observing their actions on the lower organisms." Of course this involves the destruction of the germs of certain organisms accompanying the contagious matter of certain diseases. It would occupy too much space to enter into the details of this subject; but the apparent results of Dr. Schroeter's tests may be set forth in a very few words. Heat is first considered in its effects upon such organisms as *Bacterium Termo*, *Bacillus*, etc. So far as the experiments went, it would appear that not even so high a temperature as boiling water is necessary to destroy them. But the writer urges the importance of further investigation on this point with some of the still *Bacteria* and the *Micrococcus prodigiosa.* It would certainly be a great boon to poor people if boiling clothes instead of burning them would destroy all contagious matter. Respecting chemical disinfectants, the writer points to the fact that certain fungoid parasites affect certain plants to the exclusion of their nearest allies, and that a *Bacterium* will thrive in a given fluid, but if the minutest quantity of a foreign matter is mixed with it the organism perishes. Investigations conducted with these facts in view may lead to some very important discoveries of agents to purify the blood or intestines of germs of infectious diseases. The action of permanganate acid salts is notorious. A solution to saturation of permanganate of potash or soda added to the foulest fluid obtained by placing decaying meat in water speedily clears it; a sediment is precipitated, and all evil smell dissipated. Experiments with *Bacteria*, *Mucor*, and *Penicillium* showed very strong solutions of these salts to be necessary to effect their purpose. Chlorine gas and chloride of lime are next mentioned. Scientific men differ widely in opinion as to the merits of these agents as disinfectants. Dr. Schroeter found that fumigation with chlorine gas to be effectual must be preceded by steaming or damping in some way. Dry fumigation with this gas, he asserts, is utterly useless, and more than this, it is dangerous, because men place confidence in it. Finally, the effects of carbolic acid are described. The vapour of carbolic acid quickly destroys all growth of mould in an apartment, but it at the same time gives off an almost unbearable stink. A solution of carbolic acid in the proportion of one part to 500 parts of water may be regarded as strong in regard to its action on living organisms. Even in the less concentrated solution of one part to 1000 of water, no organism can live, and probably the much weaker solution of one to 10,000 would be sufficient to arrest development. For practical purposes Dr. Schroeter regards this as the best disinfecting agent. In conclusion, he adds that, although in our present state of knowledge we may be justified in assuming that these agents will act in the same manner upon contagious matter, their real efficacy can only be proved by observing their influence on the specific organisms of contagion.

Dr. Frank records some observations on the one-sided acceleration of the flowering of a catkin-like inflorescence, due to the effect of light. He gives measurements of the length of the filaments of the male flowers of *Salix cinerea* on the north and south sides, and describes the relative degrees of development of the anthers. To give one instance, the filaments of the stamens on the south side were 8 millimeters long and the anther-cells completely emptied of their pollen, whereas on the north side of the same catkin the filaments were only about 3 millimeters long and the anthers still close.

The first article by Dr. Cohn himself is on the function of the bladders of *Aldrovanda* and *Utricularia.* This was presumably written before Mr. Darwin's observations on *Drosera* were published, and also before Dr. Hooker's paper on "Insectivorous Plants" was known in Germany, as the author speaks of the one as unpublished and does not mention the other. Dr. Burdon Sanderson's paper on *Dionœa* he alludes to, and his investigations were undertaken with the view of ascertaining whether these plants really draw nourishment from the insects and other animals captured. The leaves of *Aldrovanda* possess a certain amount of irritability, or the power of closing over captured animals. A marvellous variety of insects and small water animals was found in the closed leaves, such as minute *Crustacea*, larvæ of *Diptera* and *Neuroptera*, various genera of the *Radiata*, and living *Algæ* of the *Diatomaceæ*, *Confervaceæ*, *Nostocaceæ*, etc. From the absence of vascular bundles in the glandular hairs of *Aldrovanda*, it is assumed that the seat of the phenomena of irritability and contractibility is in the parenchyma, and not in the fibro-vascular bundles. And there is no doubt whatever that this peculiar leaf-structure is intended for the capture and killing of animals. With regard to the question whether plants like *Aldrovanda* digest and absorb the soft parts of the creatures entrapped, Dr. Cohn seems inclined to admit the possibility of such being the case. Indeed, he argues that the total absence of roots from *Aldrovanda* would seem to favour this opinion. The same observations apply to *Utricularia vulgaris.* Dr. Cohn also puts it in this way: why should plants possess traps evidently designed for catching insects, if those insects are of no use to them after they are caught?

Dr. Cohn also contributes articles on the development of the genus *Volvox* (illustrated), and a continuation of his researches on *Bacteria*, also illustrated. This paper treats more particularly of the systematic arrangement of the Bacteriaceous genera. Cohn, it should be remembered, regards this group as belonging to the *Algæ* rather than the *Fungi*, and as scarcely separable as a family from the *Phycochromaceæ.* He formerly suggested the name of *Schizosporeæ* instead of *Schizomycetes* for this group, and this he now proposes to alter to the more appropriate designation of *Schizophytæ.* He concludes with a synopsis of the genera.

Dr. Eidam is the author of another paper on the *Bacteria.* He confines himself to the effects of temperature on *B. Termo.* His experiments revealed the following principal facts. At and below +5° C. this species is benumbed with cold, and at half a degree higher it begins to increase, but in this condition it proceeds very slowly. A temperature of 30° to 35° C. is the most favourable to its rapid propagation. Exposed to a continuous temperature of 40° C., it loses the power of growing, and falls into a state of torpor, from which it rouses again upon the return of favourable conditions. Exposure to 50° C. for three hours continuously is sufficient to kill this species, when it is dispersed in a watery fluid. In return, it possesses great powers of resistance to heat and cold in a dry state, and will long retain its vitality.

The only other paper in this part is by Dr. Sadebeck on *Pythium Equiseti*; but as it has lately been attempted to connect this Fungus with the oospores of *Peronospora infestans*, it may be as well to pass this over until we know something more on the subject.

W. B. Hemsley.

Proceedings of Societies.

Linnean Society. *Nov. 3rd.*—1875, Dr. G. J. Allman, F.R.S., President, in the chair. The following botanical communications were read:—"On the rate of growth of the female flower-stalk of *Vallisneria spiralis*," by A. W. Bennett. The peduncle is remarkable for the great rapidity of its growth*, and ultimately reaches a length of three or four feet. The author's observations were chiefly directed to determine which part of the peduncle showed the greatest energy of growth. This was found to be in a portion at but a short distance below the flower-bud, a marked zone of two inches increasing ultimately relatively to the remainder of the flower-stalk in about the proportion of three to two. This is more in accordance with what has been observed in the case of roots than in that of stems. The coiling up of the peduncle so as to bring the flower beneath the surface does not take place if the flower has not been impregnated.—"On plants collected by Lieutenant Cameron about Lake Tanganyika," by D. Oliver.—"On a collection of North Celebes plants sent by M. Riedel," by D. Oliver.

Dec. 2nd, 1875.—Dr. G. J. Allman, F.R.S., President, in the chair. Mr. J. G. Baker exhibited specimens of *Pyrus communis*, var. *Briggsii*, D. Syme, and made some observations on its characters and distribution.† The following papers were read:—"On Polynesian Ferns of the *Challenger* Expedition," by J. G. Baker. The new species amounted to ten or twelve closely allied to ones already known, and no new genus.—"Revision of *Anthericeæ* and *Eriospermeæ*," by J. G. Baker. This paper is uniform in plan with those upon other tribes of *Liliaceæ* by the same author that have already been printed in the Society's Journal, and is the fifth of a set of eight monographs, in which the whole Order will be dealt with. Those still to appear relate to the tribes *Allieæ*, *Aloineæ*, *Yuccoideæ*, and to the series *Colchicaceæ*, and the small aberrant tribes, such as *Conantheræ* and *Gilliesieæ*. *Eriospermeæ* is a small tribe, marked by its racemed inflorescence, polyphyllous perianth, woolly seeds, and large tuber-like corms. It includes one genus only, long known at the Cape, and now ascertained to extend its range to Abyssinia, Zambesi-land, and Angola.

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* See Journ. Bot. 1875, pp. 276, 337.

† On this plant see an article in the "Gardeners' Chronicle," 1875, ii., p. 685.

Anthericeæ, marked by its polyphyllous perianth, non-bulbous rootstock, capsular fruit, and articulated pedicels, is one of the largest tribes of the Order, and includes between 200 or 300 species. It is divided into two subtribes—the Asphodels, with a perianth funnel-shaped when fully expanded, and the true Anthericums, in which the flower when open spreads like a star. Of the Asphodels the principal genera are *Asphodelus*, *Asphodeline*, and *Eremurus*. These belong either to the Mediterranean region or Central Asia. Of *Eremurus* the Russian explorations in Central Asia have lately discovered several striking new species, which are now being introduced into our gardens. Here belongs *Xeronema* from New Caledonia, with bright red flowers and iris-like leaves, and several other small genera. The classification of the true Anthericums has been involved in great confusion, principally because the older-named specific types were not fully described, and have afterwards been arranged out under genera by authors who had only these incomplete descriptions to guide them. Mr. Baker has been able, through the kindness of the authorities of the Upsala Herbarium, to make a leisurely comparison of the types of Thunberg with the large mass of specimens now preserved in the great London Herbaria. He considers it best to maintain as a single genus *Anthericum* almost in the Linnean sense, and to include therein *Phalangium*, *Bulbinella*, *Trachyandra*, and part of *Cæsia* and *Chlorophytum* as defined by Kunth. As thus understood, *Anthericum* is the most widely distributed of all the genera of *Liliaceæ*, and in point of number of species is exceeded in the Order only by *Allium* and *Asparagus*. A large number of new species have been gathered of late years in the northern tracts of Cape Colony and Central Africa. Near to *Anthericum* comes *Chlorophytum*, with discoid seeds, a genus of now about thirty species, almost confined to the Tropical regions of the Old World. Of a series of genera with bearded filaments, the principal representatives are *Bulbine*, *Narthecium*, and *Arthropodium*. *Narthecium* has seeds just like those of a Rush, and it is interesting as furnishing one of the best instances on record of geographical "representation." It is confined to the North Temperate zone, and there are four very closely allied species—one in Europe, one in Japan, a third in California, and a fourth in the Eastern United States. There are two monotypic genera of *Anthericeæ* with syngenesious stamens—*Echeandea* in the Andes, and *Hodgsoniola* in West Australia. The large genus *Thysanotus*, which has almost sepaloid outer perianth segments and fimbriate inner ones, is almost confined to Australia, and is represented in Chili by the monotypic *Bothriæa*. There are also in Australia two considerable genera with septicidal capsules, *Tricoryne* and *Cæsia*, the latter found lately in Tropical Africa by Captain Grant and Dr. Kirk.—"Botanical notes from Darjeeling to Tongle," by C. B. Clarke.—"On *Edgaria*, a new genus of *Cucurbitaceæ*," by the same.

Dec. 16th, 1875.—G. J. Allman, F.R.S., President, in the chair. The following botanical papers were read:—"Notes on the plants collected and observed at the Admiralty Islands, March 3-10, 1875," by H. N. Moseley.—"Supplement to the enumeration of the Fungi of Ceylon," by the Rev. M. J. Berkeley and C. E. Broome. There are two new genera described, *Endocalyx* and *Actiniceps*, possibly intermediate between the *Myxogastres* and *Trichogastres*.—"On a sport of *Paritium tricuspe*," by Dr. G. King.

Jan. 20th, 1876.—Prof. J. G. Allman, F.R.S., President, in the chair. The following botanical communications were read:—"Contributions to the Botany of the *Challenger*. No. 29. *Orchideæ* collected in the Admiralty Islands, Ternate, and Cape York," by H. G. Reichenbach. One species forms the type of a new section of *Dendrobium*.—"The Fungi of Brazil," by Rev. M. J. Berkeley and M. C. Cooke. All the Fungi known in Brazil amount to but 437 species; of these there are Hymenomycetes 356, Gasteromycetes 13, Hyphomycetes 7, Coniomycetes 5, and Ascomycetes 55. About 300 are peculiar to Brazil This apparent paucity of species (Cuba has 886 and Ceylon 1190) may be due to incomplete collection and deficient knowledge of the microscopic forms. Mr. Trail's collection, made in 1874, is included in the enumeration.—"On a new species of Oak from Sikkim Himalaya," by Dr. G. King. This is the "Katoos" of the Nepalese, and forms a fine forest tree, largely used by the European residents of Darjeeling. It is allied to *Quercus spicata*, and is named *Q. Andersoni*.

Feb. 3rd, 1876.—Professor G. J. Allman, President, in the chair. Four new Fellows were elected; five ordinary and two foreign members were proposed. Of the latter, Lichenologists will be pleased to learn that the honour is likely to be conferred on the worthy Dr. Nylander. The subjoined botanical communications were laid before the meeting, which we may remark was an unusually full one, Mr. Darwin, Sir John Lubbock, Mr. Wallace, Dr. Hooker, Prof. Oliver, Mr. Bentham, Mr. Carruthers, Dr. Masters, and other distinguished botanists being present.—"Note on *Bæa Commersonii*," by Henry Trimen. The author observed that the supposition of the old voyager Commerson having obtained the type at Magellan Straits had been founded on an error, as shown by Robert Brown. It had since been always referred to the Seychelles. Mr. C. Walter has quite lately discovered specimens growing on coral reefs in the Duke of York's Island, which through Baron von Mueller, of Melbourne, have been forwarded to this country for examination. The probability is that Commerson himself obtained his examples in 1768 from nearly the same locality, viz., Port Praslin, in New Ireland; its true habitat afterwards being confounded from the name "Praslin" (attached to the original specimen) having been supposed to refer to the island so called in the Seychelles.—"On new British Lichens," by Rev. W. A. Leighton. A careful description and excellent figures of the structural characteristics of the following genera and species are given:—*Verrucaria myriospora*, *V. succinea*, *Lecidea subdiluta*, *L. advenula*, *Melaspilea vermifera*, and *Arthronia punctilliformis*.—"Lichenes Capenses. An enumeration of the Lichens collected at the Cape of Good Hope by the Rev. A. E. Eaton during the Venus Transit Expedition in 1874," by Rev. James M. Crombie.—"Lichenes Kergueleni. An enumeration of the Lichens collected in Kerguelen Land by the Rev. A. E. Eaton during the Venus Transit Expedition in 1874-5," by Rev. James M. Crombie. Some of the species in the above two communications of the Rev. J. M. Crombie have already been briefly recorded in this Journal (n.s. vol. iv., p. 333, and vol. v., pp. 18-21).

Botanical News.

ARTICLES IN JOURNALS.—JANUARY.

Bull. Bot. Soc. France, t. xxii., pt. 2.—D. Clos, "On some plant-names."—G. Planchon, "On the Jaborandi of Brazil."—J. de Segnes, "On *Agaricus craterellus*."—F. Kjellman, "Winter vegetation of Mossel Bay; Algæ observed in the Swedish Polar Expedition of 1872-3."—J. de Segnes, "On the female organs of *Lepiota cepæstipes*."—Boulay, "The species-question and the evolutionists."—Duval-Jouve, "Histotaxy of the leaves of Grasses."—E. Facire, "On spiral-cells of *Stenocarpul Cunninghamii*, Hook."—L. Derolle, "The position of Gymnosperms in a natural classification."—Sirodot, "Development of *Batrachospermum*."—E. Mer, "Glycogenesis in the vegetable kingdom" (concld.).—E. Prillieux, "Tumours produced in wood of Apple-trees by the 'Puceron lanigère.'"—H. A. Weddell, "Species of *Calamagrostis* of the High Andes."

Scottish Naturalist.—A. S. Wilson, "Notes on Ergot."—M. C. Cooke, "Notes on rare or probable Scottish Fungi."—A. Sturrock, "*Naias flexilis* in Perthshire" (see p. 51).—M. C. Cooke, "New Scottish Fungi."

Popular Science Review.—J. Morris, "The Cretaceous Flora."—W. G. Smith, "How Mushrooms are reproduced (*Agaricus lacrymabundus*, Fr.)."

Monthly Microsc. Journ.—A. W. Bennett, "The 'absorptive glands' of carnivorous plants" (*Drosera rotundifolia* and *Pinguicula vulgaris*).

American Naturalist.—A. Gray, "Burs in the Borage family" (*Harpagonella*, gen. nov.).

Œsterr. Bot. Zeitschr.—Memoir of Ferd. Schur (with portrait).—V. de Borbas, "*Epilobium Kerneri*, n.s."—F. v. Thumen, "Fungi novi austriaci."—A. Oborny, "On flora of Moravia."—F. Hauck, "Algæ of Gulf of Trieste" (contd.).—A. Kerner, "Distribution of Hungarian plants" (contd.).—F. Antoine, "Botany at the Vienna Exhibition" (contd.).

Bot. Zeitung.—E. Askenasy, "Influence of light on the colour of flowers."—P. Ascherson, "*Centaurea diffusa* a casual new to Central Europe."—L. Cienkowski, "On the *Palmella*-state of *Stygeoclonium*" (tab. 1).—A. Ernst, "Botanical notes" (from Caracas).—M. Traube, "On the behaviour of yeast."—O. Brefeld, "The development of *Basidiomycetes*."

Hedwigia.—G. v. Niessl, "Mycological notes."—P. Magnus, "On *Æcidium Magelhaenicum*, Beck."—J. Kulm, "*Ustilago Rabenhorstianum*."

Flora.—H. De Vries, "On wood-callus (wundholz)."—Sachs, "'Rudimentary,' what does it mean?"—A. Geheeb, "Short Bryological notes."—A. de Krempelhuber, "Lichenes Brasilienses coll. a D. A. Glaziou in prov. Brasil Rio Janeiro."—S. Schulzer, "Mycological notes."

Nuov. Giorn. Bot. Italiano (24 Jan).—G. Archangeli, "On a new species of *Medicago*" (*M. Bonarotiana*: found near Florence).—A. Mori, "Histology of stem of *Periploca græca*" (tab. 1).—P. A. Saccardo, "Conspectus generum Pyrenomycetum Italicorum syst. carpologico dispos."—F. Cazzuola, "On some plants acclimatised in the Pisa Botanic Gardens."—T. Caruel, "*Vasconcellosia hastata*, Car., a little-known Papayacea" (tab. 2).—Id., "On the flowers of *Ceratophyllum*" (tab. 3).—Id., "On *Cynomorium*" (tab. 4).—De Notaris, "Two new Italian plants" (*Trapa verbanensis*, *Rumex Woodsii*).—E. Levier, "*Gladiolus inarimensis*, Guss., var. nov. *etruscus*."

Hanstein's Bot. Abhandlungen (bd. 3, hft. 1) contains a memoir by H. Vochtung, illustrated by 8 plates, on the structure and development of the stem in *Melastomaceæ*.

A fine memoir on the species of *Casuarina* by J. Poisson, with special reference to those of New Caledonia, appears in the "Nouvelles Archives du Muséum," t. x., f. 2-4, dated 1874. It comprehends an account of the anatomy and organography of these plants, and is illustrated with 4 plates. Three new species are described.

The same volume contains Decaisne's elaborate account of the *Pomaceæ*, with 8 plates illustrating the numerous genera into which he divides the Order.

The "American Naturalist" begins the year under a greatly improved form, under the editorship of Dr. A. S. Packard, jun. The help of many of the leading naturalists of America has been secured, and the whole appearance of the magazine is encouraging. The proceedings of societies are fully given, and the contents of scientific serials of various countries, with an indication of the scope of each paper. The subscription for the year is 4 dols., and the publishers Houghton and Co., Cambridge, Mass.

Mr. W. Hillhouse read a paper on Jan. 13th, before the Bedfordshire Nat. Hist. Society, "A contribution to a new Flora of Bedfordshire," which, as printed in a local newspaper, he has been so good as to send us. It consists of a list, arranged according to the "London Catalogue," of about 430 species, and represents the author's work in the county during 1875. The critical genera *Rosa*, *Rubus*, *Salix*, and *Carex* are passed over unnoticed. We welcome gladly any contributions towards another county Flora.

We understand that Lady Wilkinson, the widow of the late Sir J. Gardner Wilkinson, of Egyptian fame, contemplates publishing the series of beautiful and accurate drawings of Desert plants which he collected during his survey (1834-40), provided that a sufficient number of subscribers can be obtained. Over 200 species were carefully drawn by Sir Gardner, the originals being preserved in the British Museum Herbarium.

We have this month to record the death of an illustrious French botanist, who for half a century has been a prominent man in science, and a leader of scientific thought. Adolphe Theodore Brongniart was born at Paris on the 14th of January, 1801. He was the son of Alexandre Brongniart, the famous naturalist, who died in 1847, and early devoted himself, under the guidance of his father, to natural history pursuits. In his nineteenth year he published his first and only zoological paper, being an account of a new genus of *Crustacea*. He afterwards devoted himself entirely to botany, and in 1820 published as his first contribution the genus *Ceratopteris*, a curious and anomalous aquatic Fern which has puzzled pteridologists, and for which he established a tribe under *Gleicheniaceæ*, a position which has much to be said for it, though it has not been adopted by any subsequent systematist. At this early period of his life he must have devoted much time to the study of fossil plants, for in 1822 he published his important memoir "Sur la Classification et la Distribution des Végétaux fossiles." In this memoir he reviews the various plant-remains known to him, grouping them in four classes and nineteen genera. This may be considered as the starting-point of the intelligent study of fossil plants, and from this beginning he continued his labours until, more than any other man, he expounded the fragmentary remains of extinct floras, and traced their relations to living plants. Numerous memoirs on separate subjects followed. In 1828 he again reviewed the whole subject in his "Prodrome d'une Histoire des Végétaux fossiles," and began in the same year his great work, the "Histoire des Végétaux fossiles," of which twelve numbers were speedily issued. The progress of the work was arrested by M. Brongniart's ill health, and it was not resumed for a period of nine years, and then only three additional parts were issued, leaving the great work incomplete, to the regret of every student. The whole of the Cryptogams, vascular as well as cellular, except a portion of the *Lycopodiaceæ*, were described and figured in the "Histoire." The only records of his work on, and general views in regard to, the fossil phænogamous plants are to be found in his "Prodrome," and in the valuable article he contributed to the "Dictionnaire d'Histoire Naturelle" (1849) on fossil plants. His more recent memoirs on this subject are an account of a Lycopodiaceous cone identical with, but more perfect than, Robert Brown's Tripdosporite, and the description of a large series of gymnospermous fruits found by M. Grand' Eury in the Coal Measures at Saint-Etienne. The details of structure were so remarkably preserved in these silicified fruits, that eleven genera, each having one or more species, were figured and described. M. Brongniart's works on fossil botany, though so numerous and important, formed only a portion of his contributions to the science of botany. His investigations on Embryology are of great importance. They were published in the "Annales des Sciences Naturelles" for 1827, and continued in 1844, while his researches into the action of pollen in Angiosperms and Gymnosperms greatly advanced the knowledge of this subject. His work on the structure and functions of leaves, on the structure of stems, and indeed on almost every department of the science, was more generally attributed to him years ago. At the present time these observations form part of the common property of science, and are repeated in our manuals and text-books without any thought of him who first expounded them. In systematic botany he proposed in his "Enumération des genres de plantes cultivés au Muséum" a modification of the Natural System for which, on grounds of strict affinity, much can be said, by incorporating the incomplete and diclinous-flowered Angiosperms, which formed the third great Order of Jussieu, with polypetalous plants. As a practical system this is, however, so inconvenient that it has never found much acceptance, though it brings together many plants that are undoubtedly closely related to each other, and which by the generally adopted De Candollean method are widely separated. In addition to the general views contained in this "Enumeration," he has published many systematic memoirs on Natural Orders, or on new species and genera belonging to all divisions in the vegetable kingdom. He described the flowering plants of the voyage of the *Coquille*, and, assisted by his late colleague, M. Gris, he has been in recent years engaged in publishing the botany of New Caledonia in a series of papers extending over several volumes of the "Annales des Sciences Naturelles." M. Brongniart was elected a member of the Academy of Sciences in 1834, in the place of Desfontaines, and in the same year was appointed Professor of Vegetable Physiology in the Museum of Natural History. In 1852 he was elected a foreign Fellow of the Royal Society, and was also appointed Inspector-General for the Sciences of the University of Paris. He was made an officer of the Legion of Honour in May, 1846.

The herbarium of the late Prof. Grenier, containing most important material for the French flora, has been, in accordance with his wishes, offered to the Museum at Paris.

M. Luis Sodiro, Professor of Botany at Quito, is engaged on the completion of Jameson's unfinished "Synopsis plantarum æquatoriensium."

The herbarium of the late M. Boreau is to be sold by his family. It comprises about 20,000 species, among them all the types of the "Flore du Centre de la France," and a great number of authentic specimens sent to M. Boreau by contemporary authors. There are also about 300 exotic species. Address, for full particulars, Mme. veuve Boreau, au Jardin Botanique à Angers.

The important memoir by Prof. de Bary on the Potato Fungus will be published in the forthcoming number of the Journal of the Royal Agricultural Society, which is now passing through the press. It will contain a resumé of what is known of the Fungus, a critical examination of Mr. Smith's views, and the reasons which induce Professor de Bary to differ from them; together with an account of the life-history of the Fungus, of the means by which its life is maintained throughout the winter, and of the characters upon which it is separated from *Peronospora* and made the type of a new genus. By the kindness of the Council of the Royal Agricultural Society, we shall be able to place the report before our readers, together with the necessary illustrations.

In the recent explorations carried on by M. Auguste Mariette-Bey at Karnak, he has discovered a series of drawings of plants collected in Syria by Thothmes III., during a military expedition which he undertook to subjugate the Syrians. Though often conventionally treated, the collection of dried plants brought to Egypt by the monarch some 3400 years ago has been so reproduced by the artist on the rocky tablets that many of them may be determined, and there is a hope that some account may yet be given of this earliest illustrated local flora.

Original Articles.

JOHN JOSEPH BENNETT.

Although for more than five years Mr. Bennett has separated himself from the active world of London, and retired to a somewhat inaccessible village in Sussex, his memory is still fresh to all who in any way became acquainted with him during his long official career at the British Museum and at the Linnean Society. For more than forty years he was daily to be found in the Botanical Department of the British Museum, and for twenty years he served at the Linnean Society as Secretary, attending all its meetings, and performing the greater portion of its work. Thus being extensively known to men of science, and especially to botanists both at home and abroad, the intimation of his death will bring sorrow to many hearts, and recall the genial, warm-hearted, and distinguished man whose loss we have to record.

John Joseph Bennett was born at Tottenham, a village a few miles out of London, on the great road to the north, on the 8th of January, 1801. His elder and only brother, Edward Turner Bennett, was already five years old. The education of the two boys was begun in the school at Enfield, where they had as companions the poet Keats, Thirlwall the historian and Bishop of St. David's, and John Reeve, who made himself famous on the stage. Reeve and Bennett were mutually helpful to each other, for in return for assistance in his sums Reeve did all Bennett's fighting! After some years of private tuition in their father's house the two brothers entered upon special studies for the medical profession. They attended the lectures of the eminent anatomist Joshua Brookes, and became students at the Middlesex Hospital. In due time they passed their examinations,* and together established themselves in a house in Bulstrode Street, Welbeck Street. Thoroughly united in their affections, they were equally united in their pursuits. Their love for natural history early appeared, and received both impulse and direction from their friendship and intercourse with John Edward Gray, who, like themselves, had studied medicine, but had turned aside from its practice to lecture on botany, and to assist his father, S. F. Gray, in the preparation of the systematic portion of his "Natural Arrangement of British Plants." In this work the two brothers were cordial and active assistants, and in acknowledgment of their help a genus established for *Serratula alpina*, Linn., was dedicated to them, with the explanatory note appended, "Messrs. Edward and John Bennett, surgeons and apothecaries, of London, who devote the whole of their leisure to the study of botany and natural history, and have kindly given their assistance to this work." (vol. ii., p. 440). De Candolle had already recognised the generic distinctness of this plant, so that his name of *Saussurea* has supplanted *Bennettia* of Gray.

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* Mr. J. J. Bennett was admitted a Member of the College of Surgeons on the 1st of April, 1825.

The house at Bulstrode Street must have been at this time a singularly happy one. The language employed by the late Dr. Boott and by Prof. Bell—who is happily still with us, a vigorous patriarch, prosecuting his favourite pursuits—to characterise Edward T. Bennett is equally true of the younger brother. Dr. Boott, even on a casual acquaintance, was "impressed with his intelligence, the gentleness of his manners, and the unobtrusiveness of his character." Prof. Bell could not trust himself "to speak of him in the terms that naturally present themselves upon the recollection of all that was so good, so kind, and so talented in his character. I believe," he says, "I never knew a man in whom was combined so much that was admirable and endearing." Every word is as true of the brother, who through forty years often looked back with delight on the days of their united work and more than brotherly fellowship.

During this time Mr. Bennett largely stored his mind with current as well as standard English literature. The evenings were spent in reading, Edward listening to his brother; and night after night this was carried on, often far into the morning. In this way Mr. Bennett became possessed of the rich and extensive literary treasures which his remarkable memory enabled him at any time to use. His literary tastes led him to the study of language, and for several years at this time this was his main pursuit. The strong mental powers he possessed for tracing out affinities, and systematically classifying the materials with which he was dealing, suggested to him the preparation of a dictionary of the English language, in which the words should be grouped under their different roots, and the method and progress of development of the various derivatives should be indicated. Considerable progress was made towards the accomplishment of this object when it came to Mr. Bennett's knowledge that a similar work was in preparation by Richardson, the publication of which began in 1826. To this time, I believe, belongs the series of extracts relating to plant-names from manuscripts in the British Museum, which he placed at the disposal of Dr. Prior when he was preparing his "Popular Names of British Plants" (Introduction, p. ix.).

In the prosecution of his literary and linguistic pursuits he collected a large number of early and curious books, the examination of which in after years not unfrequently afforded him great pleasure, and enabled him to recall the pursuits of former days.

Edward Bennett at length devoted himself to zoology, and became an active worker, contributing not only strictly scientific memoirs to the current journals and transactions, but extending and popularising science by his "Tower Magazine," his "Garden and Menagerie of the Zoological Society," and the last work he executed, his edition of White's "Selborne."

During the progress of this edition of "Selborne" through the press Edward T. Bennett died, at the early age of forty years, the fatal termination of his illness being, as was believed, accelerated by the influence on his sensitive nature of the angry and unjustifiable language of a violent opponent. The revision of the later sheets of that work and the writing of the preface was undertaken by the bereaved brother. His eloquent pen relieves the sad burden of his heart in the tender, touching language of this preface, in which he laments the loss of one who from infancy upwards had been his best and truest guide, counsellor, and friend.

In 1827 Mr. Bennett received a special direction to his studies through becoming associated with Robert Brown. In September of that year, after negotiations, it was resolved that the Herbarium and Library of Sir J. Banks should be transferred, in conformity with the provisions of his will, to the trustees of the British Museum; Mr. Brown being appointed keeper, and obtaining the assistance of a botanist in the work of the Herbarium. In the following month (Nov. 20) Mr. Bennett was appointed assistant-keeper. He immediately entered upon his labours, and devoted his life to the pursuit of botany under his friend and master; nevertheless his previous studies enabled him always to take an intelligent and interested outlook on all departments of scientific investigation, and he was able to turn this to practical use afterwards in the work he performed for the Linnean Society. He sought at this time admission to the Linnean Society, and was formally received as a Fellow in February, 1828.

The winter of 1827-28 was occupied in transferring the Banksian collections to Montague House, and in arranging the plants for the use of students in the new rooms. It is hard to realise that at this time and for eight more years all the work of the department, even the merest manual drudgery, had to be performed by Mr. Bennett or Mr. Brown; occasional and special assistance could only be obtained.

Admitted into terms of closest intimacy with Mr. Brown, and assisting him in his work, Mr. Bennett caught his master's spirit. Instead of rushing into print with every novelty, and communicating to the world every first observation, like his early and life-long friend Dr. Gray, he exhibits a dislike to print. But when at length anything is published it is obvious that it is the result of an exhaustive investigation, in which every detail is minutely accurate, and the views of previous authors are completely examined, and upon this foundation a firm superstructure is cautiously and sagaciously erected. As soon as the collections were placed in consultable order Mr. Bennett must have begun to work with the plants collected in Java by Dr. Horsfield. These plants had been examined and arranged by R. Brown immediately after Dr. Horsfield's return to England in 1819. At that time Mr. Brown contemplated preparing an account of the more remarkable novelties of the collection, but the increase of his engagements and work consequent on his official relation with the Museum prevented this. Dr. Horsfield committed the work to Mr. Bennett, who undertook, with Mr. Brown's assistance, to complete and carry it through the press. This important work, the first part of which was published in 1838 and the final part in May, 1852, at once placed Mr. Bennett in the front rank of systematic botanists. His historical investigations were remarkable for their extent and completeness: take, for example, his narrative of the published records of the Upas tree, in which with searching logic he separates the fables from the facts and presents the actual state of knowledge of this tree; or his statements of the numerous errors and misconceptions in regard to the structure and classification of *Gunnera*. As specimens of minute accuracy in details, with a philosophic apprehension of the bearing of the various facts on his own generalisations or those of others, I may instance his investigations under *Ataxia Horsfieldii*, Kunth, into the structure of those Grasses in which deviations occur from the ordinary number of stamens, and the bearing of these observations upon Mr. Brown's hypothesis as to the nature of the floral envelopes in Grasses; or his exposition of the structure of the fruit of *Podocarpus*, under *P. cupressina*, R. Br., and its correlation with Abietineous fruits, and his confirmation of the views he advanced by an examination of the male flowers of the *Coniferæ*, and particularly of the structure of the pollen grains, when he pointed out the systematic value of the remarkable differences that occur in the pollen of the Abietineous and Taxineous sections of the Order. And in the direction of those physiological observations which have in later times been so much dwelt upon in England, I would call attention to his account of the singular modes adopted in the *Hedysareæ* for the protection of the pod and its contents during their progress to maturity as recorded under *Mecopus nidulans*, Benn., and *Phylacium Bracteosum*, Benn.

Besides the "Plantæ Javanicæ" only a few short papers have been published by Mr. Bennett, the majority of them being descriptions of plants collected by his friend, Dr. W. F. Daniell. A list of these miscellaneous papers is appended to this notice.

Mr. Bennett was elected a Fellow of the Royal Society on December 16, 1841. In the previous year he had undertaken the office of Secretary to the Linnean Society, which he held for twenty years. During this long term he managed efficiently the business of the Society, editing all its periodicals and attending all its meetings.

The rooms in old Montague House in which the Banksian Herbarium was placed were too small for the collections; accordingly Mr. Brown secured better accommodation in the new building erecting for the British Museum, and to those rooms the collections were removed in the summer of 1843. The Herbarium was placed in two spacious rooms; the inner containing the Banksian Herbarium, with the additions made to it since it became the public property, while the various unmounted collections, nearly all of which were systematically arranged, were placed in geographical order in the outer room. The intimate acquaintance which both Mr. Brown and Mr. Bennett had of these collections, made them almost as available to students as the mounted Herbarium, while the want of assistance throughout so many of the early years of the Department, and its very scanty supply after it was granted, had greatly interfered with the incorporation of these unmounted collections. With ample accommodation and increasing manual assistance, the following years saw large additions made to the Herbarium, and its usefulness to botanists developing. In such quiet and continuous labours the years went past until April, 1858, when Mr. Brown had a serious attack of bronchitis, which in a few weeks issued in his death. This was a great calamity to Mr. Bennett, whose profound admiration for his illustrious colleague developed in his warm heart into strong affection. He waited on Mr. Brown through his illness with unceasing and all but filial devotion, and cheered and comforted him in the last days and nights of his life. Mr. Brown bequeathed to him his Library and Herbarium; the latter was accommodated in a room in the British Museum, where it has remained to-this day, and from the Library Mr. Bennett selected 300 volumes which he presented to the Linnean Society.

It was expected that Mr. Bennett would be at once promoted from the office of Assistant-Keeper, which he had held since 1827, to that of Keeper, but in the midst of his great grief he was called upon to meet a strong attempt made to destroy the Department of Botany in the Museum. A few years before Mr. George Bentham had presented his extensive herbarium and botanical library to the country, on condition that it should be kept at Kew at the expense of the Government. The energy and perseverance of Sir William Hooker, Dr. Hooker, and Mr. Bentham had speedily raised this herbarium to one of great importance, and it was now determined to take advantage of the death of Mr. Brown, and secure the transfer of the Banksian Herbarium to Kew. With the view of ascertaining the merits of this proposal, a committee was appointed by the Trustees of the Museum to hear the evidence of those who advocated it. Sir Roderick I. Murchison, a Trustee of the Museum and a member of the Committee, took an active interest in the matter, and having carefully mastered the reasons Mr. Bennett advanced for retaining the Herbarium in connection with the Museum, he obtained some interesting facts from the witnesses in his examination of them. Although Sir William Hooker, Dr. Hooker, and Dr. Lindley gave their reasons in favour of the removal of the collections to Kew, and Mr. Bentham wished that at least the Banksian Herbarium should be sent there, the Committee unanimously recommended that the collections should be retained at the British Museum, and that Mr. Bennett should be appointed Keeper, and these recommendations were accepted and acted upon by the Trustees. This matter was a subject of great annoyance and worry to Mr. Bennett, and though the attempt was defeated, he always dreaded the renewal of the attack. He strongly maintained that it would be a serious injury to science to separate botany from the national collections of natural history and banish it from London, and he was prepared to defend this position, though he naturally shrank from anything like controversy.

Two months of the autumn of 1859 were spent, with Mrs. Bennett, on the Continent; and in the following years he found his way to some of the more picturesque districts of our own country, generally taking up his residence in a convenient centre, from which, accompanied by his wife, day after day he would sally forth, and delight himself in the beauties of the country. He had a vivid sympathy with nature, and every walk gave him a joyous gratification of that sympathy. His letters from Teesdale and Cornwall, from North Wales and Scotland are bright with his own joy, and full of warm pictures of the scenes around him. He used to say that when he took up the pen to write of what he had seen he felt as if he could never leave off. His mind was richly stored with the literary and historical associations connected with the localities visited, and his trusty memory never failed him. He had an eye also for everything eccentric or grotesque. He would with remarkable vigour of expression hit off the peculiarities of fellow-travellers, or expose the silly fashions or absurd pretensions of those whom accident threw in his way.

In the month of February, 1860, he was attacked by a severe malady, which for months created serious alarm among his friends. However, after three months of enforced quiet and patient suffering, he was sufficiently restored to be able to return to his duties, and a three months' autumnal tour in Scotland and the north of Yorkshire brought back in great measure his former health. From this time he to a large extent withdrew from active life beyond his official duties in the Museum. He was unable to perform the duties of Secretary to the Linnean Society, and he most unwillingly, but decidedly, intimated his intention of resigning the office. The President, in referring to his services, said in his annual address that "they have been too long known and are too duly appreciated for anything that I can say to add one throb to the gratitude and affection which fill the heart of every one who has had the opportunity of observing the unwearied constancy, the rare judgment, the extensive and varied knowledge, the devotion to our interest, and the affectionate attachment which have all been brought to bear upon the welfare of a society of which Mr. Bennett has for so long a period been the stay and ornament, the *decus et tutamen*." When his resignation was accepted, the Fellows unanimously adopted the following resolution, which was moved from the chair: "That the Society desire to record their deep and affectionate regret at the retirement, on account of illness, of Mr. Bennett from the office of Secretary, the duties of which he has fulfilled with unexampled zeal, judgment, and courtesy for twenty years; and to this expression of regret at his retirement they would add their cordial thanks for these unrequited services, and their earnest hope that his health may speedily be restored, so that the Society may yet enjoy the pleasure of his presence and the advantage of his counsels for many years."

It is difficult to realise the great services Mr. Bennett rendered to the Linnean Society. He was not absent from its meetings more than two or three times during the twenty years of his secretariat. The two volumes of "Proceedings" were entirely his work. He was sole editor of the "Transactions" and "Journal"; but he will be best remembered for the singularly chaste and appreciative memoirs of deceased Fellows which he annually read at the anniversary meeting of the Society. These have been justly called models of biography. Beside the records of the facts of the life, they always contain a clear statement of the work and the position in science of the subjects of the memoir, as well as a sympathising estimate of the character of men known to him. His benevolent affections never found more agreeable exercise than when in his singularly effective and feeling language he thus pourtrayed the characters of those whom he had loved and respected.

He was seldom present at the meetings after his resignation, though as a Member of Council he continued to take an active part in the management of the business of the Society. He was annually nominated a Vice-President, until at his urgent request his name was removed after he had retired from London to the country.

With restored strength he returned to the Museum in the autumn of 1860, and for many years efficiently discharged the duties of his office. His gentle and amiable disposition, his unwearied efforts to assist scientific inquirers, his varied and exact knowledge, and his intimate acquaintance with the National Herbarium, as well as with the literature and science of botany—all these, combined in the one man, made his help sought by botanists, and that all the more readily because it was so kindly and cheerfully given.

He took little active part in the world outside science, but he was a careful and interested observer of passing events. He had very decided political views, which he sometimes expressed with great vigour. He was an advanced Liberal, and though a Churchman was for many years convinced that, in the interests of the Church, as well as of the wider interests of religion, the National Church should be disestablished. He was a truly pious man, having a simple, child-like faith in the doctrines of the Gospel, and exhibiting the Christian character in his every-day life. His benevolent disposition, and his dislike to put himself in opposition, not unfrequently induced him to refrain from action where it would necessarily tread on the opinions or conduct of others, even when he could not approve of the position of his opponents. When, however, he saw anything to be duty he could not be moved from persevering in its discharge to its legitimate issue, whatever trouble it might impose upon himself or annoyance it might cause to others.

His health became somewhat impaired in 1868, and as he felt disinclined to undertake any unnecessary exertion, his summer holidays then and after were spent in some quiet retreat at no great distance from London. At this time he had again to defend the existence of the Department against the fresh attack on the part of the Director of Kew, made through the Board of Works, and this he did by so exhaustive a reply that his statement not only satisfied the Trustees of the British Museum, but also the authorities of the Board of Works, and it is believed considerably modified their views of the opinions so frequently advanced in favour of carrying the collections of dried plants and the study of systematic botany to Kew.

The autumn of 1870 found him at Maresfield, Sussex, and he was so charmed with the district that he resolved to establish himself there when he retired from his office in the Museum, which he had for some time resolved to do on the completion of his year's service. Accordingly on the 9th of November, 1870, he sent in his resignation to the Trustees, and on the 20th December he reluctantly terminated an official connection which had lasted more than forty-three years, during which his services had at all times been rendered with untiring devotion to the best interests of the establishment.

Early in 1871 he removed from his house at New Cross to Maresfield, resolved to quit the world and all its worries, and to pass the rest of his days in quiet seclusion.

He, however, continued to take a lively interest in the Museum, and in 1871 he carefully perused the evidence presented to the Royal Commission on Science by several witnesses on behalf of Kew, and by myself on behalf of the Museum Herbarium. At his request I sent down a copy of the evidence for his perusal, which he returned with the note, "Your answers appear to me to be quite satisfactory, and with my previous statements I can't think it at all likely that Kew will ever be talked of seriously again." The recommendations of the Commissioners are a curious commentary on this statement.

The remaining years of his life were quietly spent in retirement at Maresfield. It was not long before his educated neighbours discovered the striking characters of mind and heart that distinguished him, and his simple-hearted benevolence of disposition found exercise in the many unostentatious deeds of charity which he was always rendering to the poor of the village.

He died from disease of the heart on the 29th of February last.

The genus *Bennettia*, proposed by Gray to commemorate the early labours of the two brothers, was, as we have seen, set aside by the earlier name of De Candolle. R. Brown dedicated a genus of *Euphorbiaceæ* to his colleague, which was published in the last part of the "Plantæ Javanicæ" (1852), but the plants thus grouped together had been already (1846) separated generically by Moritzi, and named *Galearia*, so that Brown's *Bennettia* had also to be given up. Miquel accordingly gave Mr. Bennett's name to an undescribed genus of *Bixineae*, of which he had only a single species, a plant from Java, collected by Horsfield, and happily named by him *Bennettia Horsfieldii*. This genus though maintained in Bentham and Hooker's "Genera Plantarum" has been reduced to *Flacourtia* by Baillon.

When Mr. Bennett resigned the office of Secretary to the Linnean Society a number of his friends requested him to sit for his portrait. This now hangs beside the portraits of other distinguished men in the meeting-room of the Society. His colleagues in the British Museum obtained a bust by Weekes, R.A., which is now in the Botanical Department. The portrait prefixed is from a photograph taken in 1859, and gives a more faithful representation of Mr. Bennett than either the painting or the bust though it fails to convey the genial and benevolent expression so uniformly characteristic of Mr. Bennett's countenance.

LIST OF THE MISCELLANEOUS WRITINGS OF J. J. BENNETT.

Description of *Arundinaria Schomburghii.*—Proc. Linn. Soc., 1840, p. 51.

Description of a new species of *Phrynium* from Western Africa.—Pharm. Journ., 1855, p. 161.

Description of the Bungo, or Frankincense-tree of Sierra Leone.—Pharm. Journ., 1855, pp. 251-253.

Description of the Kobo-tree, a new genus of *Leguminosæ*, collected by Dr. W. F. Daniell in Sierra Leone.—Journ. Linn. Soc., Bot. i., 1857, pp. 149-151.

On the Nomenclature of the genus *Buffonia.*—Journ. Linn. Soc., Bot. ii., 1858, pp. 188-190.

Statement of Facts relating to the Discovery of the Composition of Water by the Hon. H. Cavendish.—Proc. Roy. Soc., vol. ix., 1859, pp. 642-644.

Note on the species of *Croton* described by Linnæus under the name of *Clutia Eluteria* and *Clutia Cascarilla.*—Journ. Linn. Soc., Bot. iv., 1860, pp. 25-30.

In early life Mr. Bennett was a frequent contributor to the

"Retrospective Review," 1820-26. He never pointed out to me the articles from his pen, but from internal evidence I have no doubt that those on Ray and Lister, and on various early and little-known travellers, were written by him. They show that long before he became associated with Mr. Brown he had a strong love for natural history, and had acquired habits of careful and exhaustive research.

WILLIAM CARRUTHERS.

Extracts and Abstracts.

RESEARCHES INTO THE NATURE OF THE POTATO-FUNGUS, *PHYTOPHTHORA INFESTANS.*

By PROFESSOR A. DE BARY, of the University of Strasbourg.

INTRODUCTION.

PREVIOUS to my undertaking, at the request of the Royal Agricultural Society, the task of endeavouring to extend our knowledge of the life-history of the Potato-fungus, I had devoted a long series of researches to this subject. Although I assume that those researches, so far as they have been published, are known, and in fact I must do so for the sake of avoiding too great minuteness of detail, yet a short *résumé* appears indispensable; and I will give it by way of introduction, referring, at the same time, to the existing literature of the subject.*

1. The Potato-fungus is usually classed with a small family of parasitic Fungi, which since 1863 has been known as the *Peronosporeæ.* Taking first the purely morphological peculiarities of these Fungi, without regard to their immediate adaptation to the medium in which they grow, we find in the first place that the growing plant (*thallus, mycelium*) consists of densely ramified tubes; these are full of protoplasm, and continuous, or without septa, except that some species, especially when they are old, have irregular septa. Some small branches of the mycelium are specially developed as organs for attachment and as suckers; others produce the organs of reproduction. One set of these bear non-sexual cells (*conidia*), and are therefore called "conidia-bearing" (*conidiophores*); others, which mark the complete development, form at their tips the sexual organs: these are (first) the bladder-shaped female cells (*oogonia*), from the protoplasm of which a thick-walled *oospore* is produced after fertilisation by (second) the small male cells (*antheridia*). From the germinating oospore springs

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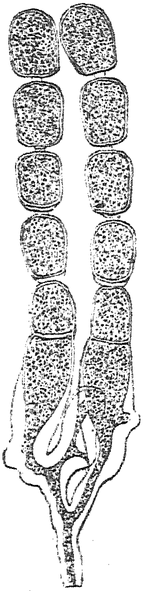
* "Recherches sur le développement de quelques champignons parasites," Ann. Sc. Nat. 4^{me} série, t. xx. "Die gegenwärtig herrschende Kartoffelkrankeit," Leipzig, 1861. "Zur Kenntniss der Peronosporen," De Bary & Woronin, Beitr. z. Morphol. &c. d. Pilze, heft 2, p. 35.

directly or indirectly one or more new rudimentary mycelium threads ("germ-tubes"), with which the process of development just sketched begins afresh. I have here employed for the sexual organs and their products the terms which at present are most in use, and shall continue to do so in the following pages, though other terms might be employed which are more correct. The use and explanad tion of these, however, would lead me beyon my present purpose.

Fig. 1.



Branch of the mycelium of *Cystopus Portulacæ*, Lev., with conidiophores. Magn. 390 diam.

The known forms of mycelium present great similarity of structure, notwithstanding some peculiarities which supply valuable characteristics for distinguishing species.

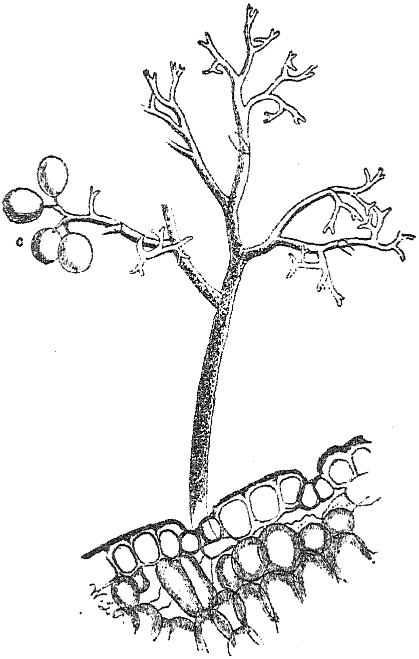
The characters derived from the structure and growth of the conidiophores divide the *Peronosporeæ* generally into two, perhaps better into three, genera, *Cystopus*, *Peronospora*, and a third, which may be called *Phytophthora.*

The conidiophores of *Cystopus*, the Fungus of the "white rust" of plants, are short, club-shaped, terminal branches of the mycelium, which bear on their expanded apex a single row of conidia, developed in basipetal order. The conidiophores grow in large bunches (see Fig. 1). In *Peronospora* (see Fig. 2) the conidiophores occur singly, or in small bunches, and are tree-like or dichotomously-branching tubes. On the sharp end of each one of these branches a solitary conidium is formed, and this is never followed by a second.

Phytophthora (see Fig. 3) is distinguished from *Peronospora* in having not one but several conidia successively formed at the end of each branch of the tree-like conidiophore. When the first conidium is ripe, it is pushed to the side by an unequal swelling of the point to which it is attached. The top of this swollen portion then begins to grow in the original direction of the branch into a new, conical point, and when this has reached a length equal to that of a conidium or a conidium and a half, a new conidium is produced at its apex. The same process may be repeated in vigorous specimens from ten to fifteen times. After the falling of the very easily-shed conidia, as many swellings remain on each branch of the conidiophore as there had been conidia; such swellings do not occur in the stems of the true *Peronosporæ*, but are a sure empirical character of the *Phytophthora.* Among the well-known forms of the family, the Potato-fungus, *Peronospora infestans*, Mont., is the only one which has this peculiarity. It may therefore be distinguished as *Phytophthora infestans*.

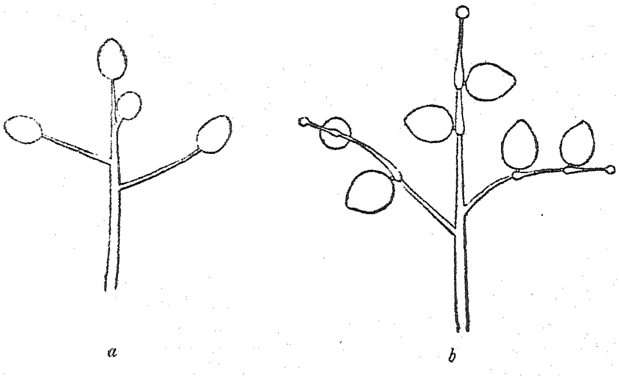
The further development of the mature conidia is the same in *Cystopus*, *Phytophthora*, and many species of *Peronospora* (see Fig. 4). If fresh ripe conidia are placed in water, their protoplasm, separated into three to eight or more portions, issues through the swelling gelatinous membrane of the tops of the conidia, and move freely in water,

Fig. 2.



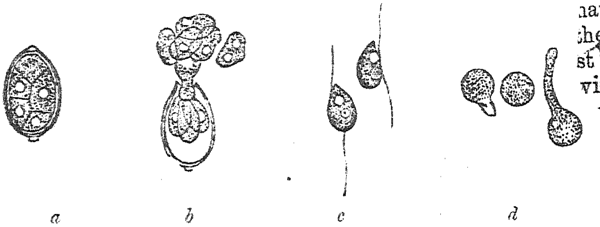
Conidiophore of *Peronospora arborescens*, Berk., growing out of a stomate of the stem of *Papaver somniferum*, Linn, *c.* Four conidia still attached to the ends of the branch. Magn. 200 diam.

Fig. 3.



Conidiophores of *Phytophthora infestans*. *a.* Formation of the first series of conidia at the tips of the branches. *b.* First stage of the growth of the third series of conidia; the first and second series have been pushed to one side, but are still attached to the swollen parts of the branch. Magn. 200 diam.

Fig. 4.—*Phytophthora infestans.*



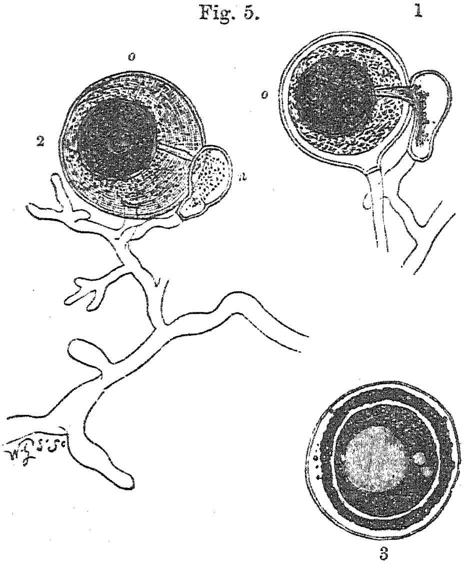
a. Conidium, in water, with the protoplasm divided to form the zoospores *b.* The zoospores escaping from the apex of the conidium. *c.* The zoospores in motion. *d.* The zoospores which have ceased to move, and are beginning to germinate. Magn. 390 diam.

like so many swarmspores (zoospores). After a short time these come to rest, and, on a suitable medium, each developes a new mycelium. From the facts just mentioned, these conidia may be called zoospore-forming cells, or *zoosporangia*, a name which is employed for similar organs observed in other water Fungi and Algæ. The zoosporangia of all these plants, when disturbed or prevented by any cause from forming zoospores, grow at once into a new plant (thallus or mycelium); and this also often happens in *Peronospora* and *Phytophthora.*

In most species of *Peronospora* (those called *acroblastæ* and *pleuroblastæ*) this phenomenon is the rule without exception. Zoospores are never formed, but each conidium grows into a single mycelium tube. A small number of species (*Peronospora plasmatoparæ*) are intermediate between the two just mentioned, but they do not require to be here described.

The sexual organs and oospores of all the species of *Cystopus* and *Peronospora* have essentially the same structure, the characteristic differences which they possess being of *specific* not of *generic* value. The oogonium is a globular cell, completely filled with protoplasm, generally the end of a mycelium branch, rarely in the middle. Contemporaneously with the oogonium, or only a little later, the antheridium belonging to it is developed in the end of another mycelium branch, which has already attached itself firmly to the young oogonium. The antheridium is a much smaller cell than the oogonium, and is mostly oval or club-shaped. Both organs grow together, closely united until they reach their full size, and then follows the fertilisation of the oogonium and the formation of the oospore. In the oogonium a thick globular mass of protoplasm, particularly fatty, separates itself from the rest. It occupies the central and larger part of the cavity; the periphery is filled with the less compact mass of protoplasm. After the separation of the protoplasm, the antheridium sends out, from the surface applied to the oogonium, a small beak-shaped projection, which pierces through the walls of the oogonium towards the central mass of protoplasm. As soon as this projection touches the surface of the globular mass it ceases to grow, and a cellular membrane surrounds the surface of the globule. This membrane increases in thickness, and becomes the inner membrane of the oospore (endosporium);

Fig. 5.



1 and 2. *Peronospora Alsinearum*, Caspary, on *Stellaria media*, Smith. *o*. Oogonia. *n*. Antheridia shortly after fertilisation. A considerable portion of the mycelium is shown in Fig. 2.

3. *Peronospora grisea*, Unger. Oogonium and oospore not quite mature, median (optical) section. All magnified about 390 diam.

while at the same time there is formed on its outer surface, from the peripheral or surrounding protoplasm, the outer membrane (episporium), which is mostly of a very dull colour, often dark. The oospore grows in this way from the globule in the oogonium. The walls of the oogonium and the antheridium may either assist the mature oospore or wither.

The mode of germination of the ripe oospore is known in *Cystopus candidus*, and in some species of the *Peronosporæ pleuroblastæ* (*P. Valerianellæ*, *P. Alsinearum*). In *Cystopus* the oospore produces numerous zoospores; and as regards the formation and further development of these all that has been already said respecting zoospores holds good. In the species of *Peronospora* just mentioned, each germinating oospore sends out a mycelium tube, like that of the conidium belonging to it. It is, therefore, quite probable that the species of *Peronospora* which, like *Cystopus*, produce zoospores from their conidia, present also the same phenomenon in connection with the oospores.

Up to this time the sexual organs have not been observed in *Phytophthora*, the Potato-fungus. What is known of it in other respects corresponds so well with *Peronospora* that there is doubtless every reason to expect exactly the same sexual organs in the one as in the other. Still this is not certain; and, in particular, stress must be laid on the fact there is another group of Fungi to which, as far as our knowledge goes, the Potato-fungus might with equal reason be compared; I refer to the family of *Saprolegnieæ*, Fungi which for the most part live in water; some grow in living plants. Their mycelium and the mode of formation of their zoospores essentially agree with what is observed in *Peronospora*, but the form of the zoosporangia is often, though not always, different. The principal difference of the two families consists in the mode of formation of the oospores, for in *Saprolegnieæ* the entire protoplasm of the oogonium goes to form the oospores—forming either *one* by separating itself entirely from the oogonium and surrounding itself with the endospore and epispore, or forming *several* by separating into a number of parts, each of which possesses the structure of an oospore. The shape of all these organs is always very like that of the same organs in *Peronosporeæ*, and the method of germination in the oospores is also similar; but the oospores themselves are usually smaller and more slender. Should, therefore, *Phytophthora* come to be classed with the *Saprolegnieæ*, the mode of formation of the oospores would be expected to be similar to what is known to take place among its allies, just as when it is placed, as it usually is, with the *Peronosporeæ*, we ascribe to it the same method of reproduction as we find in that family.

2. The phenomena connected with the growth of the *Peronosporeæ* are tolerably uniform; all are typical parasites in living plants containing chlorophyll. Their complete development is dependent on their finding the living organism, with its chemical and physical properties, which will afford it a suitable host; and most species are so restricted in this respect that they can only grow in certain species or groups of species of plants and not in others, a condition of things which holds good for parasites generally. But this does not exclude the possibility of bringing a parasite more or less forward in its development by means of artificial nutriment.

That the species of the *Peronosporeæ*, as parasites, do more or less interfere with the life of their host and produce disease in it must be obvious; and the circumstances under which this occurs are too generally known to require detailed explanation here.

The mycelium of the *Peronosporeæ* grows in the living tissue of its host, and with the greatest vigour when the foliage and flowers are being rapidly produced in the summer; this to some extent determines the principal season of the growth of these Fungi. At the same time it should be remembered that the mycelium of particular kinds may, in the case of perennial plants, also continue to live in and along with the perennial parts, and annually to spread from them to the parts developed in summer, and so extend itself along with these, as, for instance, *Peronospora Ficariæ* in *Ranunculus Ficaria*, *P. Rumicis* in the Sorrel, *Rumex acetosa*.

The tubes of the mycelium grow chiefly between the cells of the tissues of the host-plant, not only touching the cells, but in most species also pushing their small branches, which I have before called suckers, into the interior of the cells.

In certain species, which do not concern us here, the conidiophores are formed only on very special regions of the host; in most species they may grow wherever there is mycelium. They are produced when the mycelium passes out from the tissues of the plant into the air—that is, with rare and casual exceptions, upon the surface of the plant, particularly the foliage. In *Cystopus* they form thick layers under the epidermis, which they burst open by the increasing accumulation of conidia. In *Peronospora* and *Phytophthora* they penetrate the epidermis into the air, either singly or in small bunches, mostly through the stomata; in parts where these are absent they pierce through the cells of the epidermis. The mature conidia fall from their pedicels, and being light bodies are readily carried away by currents of air or by minute animals. As soon as the conidia are mature they are ready to germinate, and do indeed germinate when surrounded with moisture, and form zoospores when they are placed in water. The germinating spores, when they find a suitable host, at once penetrate the epidermis into the interior of the plant, and grow into new mycelium, which soon again pushes into the air and forms more conidia. A short time and a small quantity of water are all that is needed for the germination of these spores and their penetrating the host-plant. A single damp night or a short shower furnish the necessary conditions. After a few days the new mycelium sends out its first conidia, and these continue to be followed by others for weeks. These phenomena explain why it is that the Fungus in question is able to spread itself in summer rapidly over large districts and attack many plants. The conidia are the organs of this propagation. They do not retain their vitality and power of growth for more than a few weeks at most. That they remain alive through the winter has in no case been observed.

The oospores of *Cystopus* and *Peronospora* are formed in the interior of the tissue of the host, mostly between the cells, rarely in the interior of the cells, as, for instance, in *Peronospora Sempervivi*, discovered by Professor Schenck. They have their origin either in the same part of the host where the conidia occur, or their formation is limited to a particular spot. The species of *Peronospora* which inhabit different kinds of host-plants are found on all of them, or at least on several of them, with conidia as well as with oospores, *e.g.*, *P. Alsinearum* on species of *Stellaria* and *Cerastium*, *P. Ficariæ* on several species of *Ranunculus;* or they form conidia on all hosts, but oospores only on certain hosts, *e.g.*, *Cystopus cubicus*. When therefore a species of *Peronospora* is always found in a phanerogamic plant with conidia only and without oospores, it is fair to conjecture that the Fungus inhabits also another host-plant in which the oospores must be sought. This conjecture must be based, not on a single instance, but on extended and long observation, for both the presence and the absence of oospores may be due to other causes, such as climate and season. I find *P. Alsinearum* in the country here on *Stellaria media* always with oospores and conidia in spring, while in autumn often with conidia, but never with oospores. In *Cystopus candidus*, the well-known Rust-fungus of the *Cruciferæ*, the oospores occur very seldom in North Germany, so far as my experience goes, but are common in South-west Germany in many species of host-plants. We have not then absolute laws to deal with here, but laws which in special instances admit of exceptions. For example, *Cystopus cubicus* occurs very often on species of *Tragopogon*, *Podospermum*, and *Scorzonera*. I have found it almost always with conidia and oospores in *Sc. hispanica*, but for years as regularly without oospores on all other hosts. In one case, however, I found the oospores on the leaves of *Tragopogon porrifolius*.

When the oospores are mature, the part of the host which contains them soon dies. It then withers and falls to the ground; the dead tissues, and often also the membrane of the oogonia, decay, and the oospores alone survive. In places where they exist in great numbers they can be detected in the ground. A considerable period of apparent inactivity precedes their germination; it does not, in the cases hitherto observed, take place till after the winter has passed, no matter whether the maturity has been arrived at in autumn, or, as is mostly the case, in early summer. The germination of the oospore and the penetration of the young Fungus into the host-plant occur in the moist and warm season which succeeds the winter; the renewal of summer vegetation is taken for granted. The oospores therefore act as the organs of hibernation in the life of *Peronosporeæ*; and for the species which grow only during the summer, the oospores are the only means for carrying them through the winter. Others may, as has been shown above, hibernate by means of perennial mycelium.

All the foregoing statements have been confirmed by direct observation made in special cases. In no particular do they rest on mere conjecture. It will be apparent then that, as regards the whole life-history of the *Peronosporeæ*, there exists a general plan, which, however, presents numerous variations in detail according to the species. This must be kept clearly in mind in the investigation of every case which occurs in practice, so that, while we follow the general well-established rule, we must, nevertheless, not expect identical phenomena in all cases.

Of the *Saprolegnieæ*, which must be considered in connection with the question before us, only a few species of *Pythium* are parasites. Most of the species live in dead organic bodies. What we know of the species parasitic on living plants corresponds with the ,known phenomena of the *Peronosporeæ*, to such an extent, at any rate, that it is unnecessary to describe them here minutely. One fact only is important, viz., that the oospores of the *Saprolegnieæ* often live through the winter, or, at least, *are able* to remain a considerable time in apparent inactivity; while, on the other hand, it has been observed that they are capable of germinating within a few weeks, or even a few days, from the time they attain maturity. From this it is evident that oospores, even of closely related forms, do not always pass through the same series of changes; and, since the oospores of some species of *Peronospora* present great similarity of structure to those of *Saprolegnieæ*, it may be regarded as possible that such species would exhibit the same phenomena in their history.

There is yet another circumstance which must here be referred to. There are parasites which cannot complete their entire development in *one* host-plant, but require *two* different species of hosts; in the one they complete a distinct stage of their development, in the other the second stage, and then return to the first host to begin again. This necessary change of the host is called *heterœcia* or *metœcia*. We have familiar examples of this among animals in the Tapeworms, and among Fungi in many of the Rusts. It should be remarked here that metœcia has not been observed, and is not even likely, to occur in any *Peronospora* or *Saprolegnia*; all the species belonging to these families which have been thoroughly investigated, are known to have only a single host on which they complete without change their entire development—they require no second one. Sometimes the species parasitic on one host-plant attaches itself to another host, but only partially carries out its development in it, say as far as the formation of conidia; but it should be noted that this is a phenomena altogether different from that of metœcia.

LIFE-HISTORY OF THE POTATO-FUNGUS.

3. Let me now try to explain, from known facts and from the observations that have just been made, what is known of the life-history of the Potato-fungus, and what yet remains to be discovered. In the first place, it is generally known that when the Potato-fungus has once made its appearance in the fields in summer, its progress, so far as concerns the formation, mode of distribution, and germination of the conidia, is the same as that described above in connection with the *Peronosporeæ.* It is further known that the conidian growth is not only found in the foliage, but that it extends to the tubers in the ground, and there developes the mycelium, which is the immediate cause of that injury to the tubers which is so dreaded. On the decay of the foliage, and when the tubers have been gathered, the Fungus disappears from the field, and does not appear again till next summer; generally not when the young foliage appears, but about the time of the blossoming of the Potato, or even later. The question then arises, Where does it remain in the period between its disappearance and its reappearance? How and where does it winter, and how does it pass from its winter quarters to the foliage of the Potato?

In the first place, it is clearly established that the conidia of the Potato-fungus have a very short existence, and are incapable of living through the winter. From what is certainly known about all other *Peronosporeæ* and also about *Saprolegnieæ,* we can look only to oospores, which endure throughout winter, and to perennial mycelium for maintaining the life of the Fungus. It has long been known that perennial mycelium frequently occurs in the tubers, and to this point I shall again recur. Oospores have not been observed in the *Phytophthora;* but from analogy it may be taken as certain that they may somewhere occur. The discovery of them would at once fill up the gap both in the morphology of the Fungus and in the practically important question of how it hibernates. And, accordingly, ever since the oospores of a *Peronospora* were discovered, innumerable searches have been made for those of *Phytophthora.* I have myself looked for them for fifteen years, and on every opportunity have searched for them in the stalks, leaves, flowers, fruit, and tubers of the Potato. In July of the present year (1875), when the Fungus appeared in this district in sad abundance, I obtained a very large amount of material for study, and at the same time secured the kindly assistance of two botanists experienced in researches of this kind, Dr. Rostafinski and Dr. Stahl. But again only negative results were arrived at.

4. From the researches on the tubers it seemed possible that by other methods the oospores in the Potato might be discovered. It is known that in tubers which are well-ripened and comparatively free from water the mycelium is capable of living and vegetating for a long time, even until well into the following summer. If we cut

such tubers and place them in a moist atmosphere, the Fungus grows luxuriantly from the cut surface, and forms stronger conidiophores than anywhere else. In a moist atmosphere the Fungus will send out conidiophores through the skin; and Kühn* has called attention to the fact that this phenomenon occurs in cellars without artificial encouragement. Since then known facts do not exclude the possibility of *Phytophthora* being a *Saprolegnia*, or, at any rate, being closely allied to *Saprolegnieæ*, and since most Fungi of this family grow in water, while even the few species which are parasitic on land plants fructify most abundantly under water, the question arises whether this may not also hold good of the Potato-fungus, particularly as regards the formation of oospores. Accordingly, tubers with abundance of mycelium were repeatedly placed in spring-water. The invariable result was that numerous branches from the mycelium grew in the water. These had the same peculiarities as branches sent out in the moist air; some even assumed the character of conidiophores, forming at the extremity conidia, which, without falling off, produced zoospores, resembling in this respect the sporangium of *Saprolegnieæ*. But each time this entire water-vegetation of the *Phytophthora* quickly perished with the corruption of the Potato, and not the slightest trace of oogonia was found. The same experiment was repeatedly made with stalks and leaves which were filled with the Fungus, but always without any positive result, because a plant which the Fungus has attacked at once becomes rotten in water, and the *Phytophthora* dies as soon as the surrounding tissues are rotten.

The experiment was then so far changed by placing the same substances in moist earth instead of in water. From the tubers grew up the usual conidiophores; but here also the stems and leaves quickly became rotten, and the Fungus with its oogonia nowhere occurred. Other forms of Fungi, not belonging to *Phytophthora*, were, it need not be said, very often found.

5. After these successive failures, there still remained a possible method of discovering the oospores, suggested by another phenomenon observed in the tubers. It is known that Potatoes which are injured and infested with *Phytophthora* are capable of sprouting like healthy specimens, and even producing entirely healthy shoots and plants. While examining diseased tubers of this kind which had sprouted, I had often, after they were shrivelled, found, in the tissue which contained the *Phytophthora*, bodies which, it might be supposed, were oospores of a *Peronospora* or a *Saprolegnia*. On the other hand, I had observed in several previous experiments with diseased tubers a condition of the mycelium which seemed to promise a positive result. It is known that the starch contained in the healthy colourless tissues of the sprouting tuber is gradually reduced in quantity, and that the large cells become filled with watery liquid. Owing to this the whole structure becomes watery-transparent: it remains at first turgid and firm, then afterwards it collapses and decay takes place. In the diseased tubers this phenomenon occurs in the tissues which have remained healthy, and which are principally found in the centre of

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* "Zeitschrift des landwirthschaftlichen Central-Vereins d. Provinz Sachsen," 1870, No. 12.

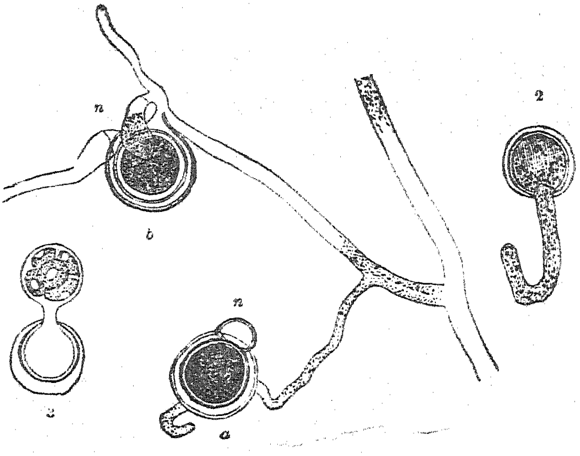
the tuber, while the Fungus generally keeps to the periphery or exterior portion, where it discolours and kills the cells. During the sprouting of the tuber we can see the Fungus shooting from the discoloured portion into the watery and healthy centre, where it grows very luxuriantly. It sends out many branches between the cells of the tuber, and also forces short branches into the interior of the cells; it is vigorous, filled with colourless protoplasm, and gives an impression of most exuberant growth. No discoloration of the watery-tissues, it should be said, takes place. These phenomena suggested the possibility that the luxuriant branching of the Fungus in the sprouting Potato was for the purpose of forming the oospores. On this hypothesis hinged another, viz., that the supposed formation of oospores must be completed, and the oospores matured, simultaneously with the shrivelling up of the seed-tubers. This would, moreover, be about the time of the full development of the Potato-plant, when the Fungus usually appears in large quantities. Now, it is not absolutely necessary that oospores should pass a winter before germination; the germination, as has been stated above in regard to *Saprolegnieæ*, may take place speedily after they arrive at maturity; and in the *Peronosporeæ* it may at least be looked upon as a possible phenomenon, depending upon surrounding circumstances. Thus arose the conjectures that perhaps the oospores of the Potato-fungus originated from the mycelium growing in the sprouting tuber; that the oospores germinate immediately after they reach maturity, which is contemporaneous with the full development of the foliage; and that their germs at once attack the foliage. The difficulty in the way of accepting this theory, because the tuber is under while the foliage is above the ground, is easily set aside when we remember that the sprouting tuber is almost always sought after by minute animals—*Acarus*, *Julus*, and *Lumbricus*—by whose agency the oospores could readily be brought to the surface of the soil.

I must begin by saying that the researches made for the purpose of testing these theories have also been followed by *purely negative results*. Still it will not be useless if I describe briefly the various steps of the experiments.

At the end of February and beginning of March a considerable number of Potatoes, up to then healthy, were artificially inoculated, varieties being selected which were known to have remained a long time watery-turgescent after sprouting. The inoculation took place in this way: fresh conidia, capable of germinating, were placed on the terminal eyes of the tuber; the infected spot was then covered with a piece of wet blotting-paper, and the tubers were placed in a moist atmosphere (under a glass bell), out of which they were not taken for several days. By this process infection can be obtained with great certainty; the existence of the Fungus is, after some time, clearly visible externally by the browning of the eyes and the sinking of the surrounding parts. In continuing the experiment, only those tubers were made use of in which infection had actually taken place—about sixty in number—and the microscopic examination which followed invariably disclosed the presence of the Fungus in their interior. At the end of March and beginning of April they were planted partly in flower-pots and partly in the open ground. From the eyes which remained healthy they sent out many shoots, mostly healthy, but also some affected by the Fungus, which will afterwards be described. They were examined one by one, according to their different stages, the last on the 5th of July, with the result that the phenomena already described presented themselves successively in the interior. Oospores were not found. Other Fungi, not belonging to *Phytophthora*, were often found growing abundantly in the collapsing watery-tissues; animals of the kinds already mentioned and infusoria were also observed.

6. A great abundance of Fungi was developed in the tissues of the outer portion of the Potato, which are known to resist decay very long, but which were discoloured by *Phytophthora*. The Fungi were developed while the tubers were still in the ground. These Fungi were chiefly of the kinds that have long been known to attack sickly tubers, such as *Fusisporium* and *Spicaria;* it has also been long known that these have no morphological relation to *Phytophthora*. But in several tubers which had sprouted in the ground, and were very much collapsed in the interior, there was found, not only in the experiments made in 1874, but also this summer, in the discoloured tissues containing *Phytophthora*, a form of Fungus, the first sight of which showed that it must be either a *Peronospora* or *Saprolegnia*, with oogonia, antheridia, and oospores (see fig. 6). The suspicion readily suggested itself that the organs of *Phytophthora* which had been so long looked for were at last found. However, in this case a closer examination showed that this was a mistake. It will, however, be instructive for my purpose to enter here into some details. The presumed oospore-bearing Fungus was found, as has been said, in the

Fig. 6.



Pythium vexans, De Bary. 1. A mycelium-tube with two oogonia (*a* and *b*) almost mature, with antheridia, *n*. In *a* the attachments of the oogonium and antheridium are not seen, being behind; in *b* the insertion is somewhat oblique. Magn. 600 diam. 2. Germinating oospore sending out mycelium. 3. The same forming zoospores. 2 and 3 a little less magnified than 1.

tissues discoloured by *Phytophthora*, and that, too, in the *interior* of the cells. Its oogonia, in various stages of maturity, were supported in a characteristic manner (which I shall more fully describe hereafter) on cylindrical threads without septa, completely resembling in structure those of *Phytophthora*, though, it is true, distinguished by a different distribution of protoplasm, and by being much thinner than the usual *Phytophthora* mycelium. It became, however, abundantly clear that these thin threads were branches of other mycelium which corresponded in thickness with the mycelium of *Phytophthora*, and, like it, buried themselves among the cells of the Potato in the intercellular passages. It was scarcely possible, especially in the discoloured tissues, to draw a positive distinction between the two kinds of intercellular filaments.

The oogonia (1, *a*, *b*) are round cells. Their position on the mycelium is either sessile on its outside, or they are inserted with a broad base into the mycelium-tube. In contact with the oogonium lies an antheridium—rarely two—which, as a rule, is club-shaped, and rises close to the oogonium from the same tube (1, *n*). Unimportant exceptions to this rule may here be passed over. A single oospore is formed from the whole of the protoplasm of the oogonium. It occupies the cavity, is nearly globular, and at the period of maturity has the usual oospore structure described above, with very thin, smooth episporium, which when mature is of a light yellowish-brown colour, like the persistent wall of the oogonium. In the proper place, then, and at the very time when they were sought for, there were found oospores which might have belonged to *Phytophthora infestans*, not only from their structure, but also because they *seemed* to spring from thin branches of the intercellular mycelium of that Fungus. They differed from all similar organisms which I knew, in their small size, and in the peculiar insertion of the oogonium and antheridium. To test the value of the conjecture that these were the oospores of *Phytophthora*, an attempt was made to obtain their speedy germination. To observe this, thin slices from one of the Potatoes in which they were particularly plentiful, but in which other Fungi and Infusoria were relatively scarce, were placed in drops of water on object-glasses, and the oospores were further isolated. Some of the oospores sown in this way germinated, sending out, within twenty-four hours, a tube, which became several times longer than the diameter of the oogonium (Fig. 6, [2]); in the course of one or two days some of these tubes also sent out several short branches, and then they ceased to grow. Previous to this the extremity of the tube or of a branch often swelled into a round bladder, into which all the protoplasm was collected, and which was then cut off by a septum. The young plant did not grow further. When the Potatoes which were experimented on had been kept a few days longer in a moist atmosphere, so as to prevent them drying up, and secure the complete maturity of the oospores, new sowings were made. In this case the result was different. Some of the oospores did not germinate; but a large number of others speedily sent out a thick, short, straight tube, which grew to about the length of the diameter of the oospore, and then its further growth lengthways ceased; but soon its extremity suddenly swelled out into a globular bladder. Into this, while it was swelling out, streamed all the protoplasm of the oospore, formed itself into a ball, and then quickly divided itself, generally into from six to eight portions (the number is variable), which, like so many *zoospores*, rapidly quitted the dissolving gelatinous bladder (Fig. 6, [3]). These zoospores resembled those of species of *Peronospora* and *Pythium*, and of *Phytophthora* in form, structure, and movement (differing, perhaps, from the latter to a small extent in size, but this was not precisely determined). Like these they moved about a short time in the water, after which they became quiet and germinated. Their first tubes (germ-tubes) remained short and without branching, even for several days, in the cultivated specimens which have been described. In two hours after sowing, the first zoospores were found, mostly in the drops of water. Their number was usually much increased in the hours immediately following.

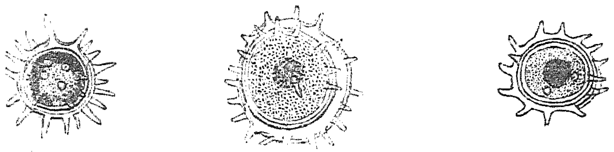
Thus were developed young plants (germ-tubes) and zoospores which completely resembled those of the Potato-fungus. Only one thing was wanting; but that was, without doubt, the chief thing, viz., the proof that what was found really belonged to *Phytophthora*, and not to some other Fungus resembling it and accompanying it. The proof here required could only be obtained by ascertaining if the young plants (germ-tubes) and zoospores would grow on a suitable nidus or substratum into undoubted *Phytophthora*. There was no need for uncertainty in determining this, since sufficient quantities of the zoospores or germinating bodies of the oospores could be had, and since the conditions attending the development of *Phytophthora* from its spores were known. Accordingly I made numerous sowings of the oospores in drops of water on fresh leaves, stalks, and tubers of the Potato. The formation of the zoospores was easily confirmed in these sowings. But nowhere did the young plants (germ-tubes) advance beyond the stage of development which they reached on the glass, nowhere did they penetrate into the interior of the living parts of the plant, and nowhere did they develope mycelium. This result, repeatedly confirmed with certainty, could mean nothing else than that these oospores did *not* belong to *Phytophthora*, but to another Fungus, which apparently had entered into the already dead tissues of the tuber while it was still in the ground. The facts observed regarding this Fungus corresponded best with the genus *Pythium;* and since it did not take possession of the living Potato-plant, it was to be expected that, like most of the members of this genus, it would find its suitable nidus or substratum in dead organic bodies. From experience acquired in connection with other species of *Pythium*, I now made sowings on dead animals, by placing small fragments—as the legs of flies and newly-killed mites—on glasses, in drops of water in which the zoospores of the Fungus were abundant. In this manner I might be able to observe step by step the whole of the fu[illegible] development. The zoospores at once attached themselves in gre[illegible]mbers to these fragments, and sent out tubes which developed into [illegible]did mycelium, and ramified in the animal substances and in the su[illegible]unding water. It did not form zoospores, but, on the other hand, it [illegible]med oospores in the *interior* of the body of the mites, exactly like those found in the cells of the Potato. I pass over here several othe[illegible] observat[illegible] which were made at this time, because they do not concern the question before us, but I would only remark, in reference to the *Pythium*, that it is a species which has not hitherto been described, and which I now call *P. vexans*, because it has occupied me for almost the whole of two long years.

Before entirely leaving this department of the subject, I wish to record another experiment; and in this case also, not because I gained anything positive toward the solution of our problem, but because it shows how carefully one must guard against being deceived in investigations of this kind. For the sowing of *Pythium vexans* I had got, beside others (July 20), half-a-dozen fresh new Potatoes. Externally they looked healthy. One was immediately used for experiment and cut in two. I placed a sowing of *Pythium* on the cut surface of the one half; I did not inoculate the other half; each was placed separately under a small glass bell in a moist atmosphere. On the next and the second day the germination of the *Pythium*, as described above, was confirmed in the inoculated half. But on the third or fourth day I was agreeably surprised to find on the inoculated surface the beautiful conidiophores of the Potato-fungus.

It is true that they were not growing on the very spot where I had sown the *Pythium vexans;* still, they were close to it. From that point outward to the edge they covered the surface of the section, and they also extended down the thin skin of the external surface for some distance. In these places mycelium was always found in the interior of the tubers. Search was made in vain for a connection between it and the young plants grown from the sowing of the *Pythium*. The non-infected half, which from the beginning of the experiment had been kept quite isolated, also presented, on the same day as the infected half, conidiophores of the Potato-fungus on its surface. Up to this point the other Potatoes had been preserved in a different place, lying exposed to the dry air of the room. Externally they appeared to be healthy, with the exception of one or two dark spots on the surface. They were placed without any artificial infection under glass bells in a moist atmosphere, and the disease, together with the eruption of conidia, appeared in all of them in from two to three days. I had, therefore, been working with material which was diseased before I employed it in the experiment; and this need not seem strange when we remember that from the middle of July onwards the Potato-fields of this district had been frightfully destroyed by *Phytophthora*. Still, the appearance of the conidiophores of the Potato-fungus on the half of the Potato infected with *Pythium* might have led to a serious and disagreeable deception, but for the opportunity of checking it just described.

7. In the tissues of Potatoes penetrated with the mycelium of *Phytophthora*, there sometimes appear other bodies, which might be regarded as oogonia or oospores of the Potato-fungus. I have several times found them with *Pythium vexans* in old collapsed tubers which had sprouted in the ground, and once without *Pythium* in a living stalk which had been on the ground. But they were always restricted to those regions which were occupied by the *Phytophthora* mycelium, and always occurred (with one doubtful exception) in the interior of the dead cells of the Potato. These bodies, when ripe (see fig. 7), have a globular form with a fine muricated surface. The prominences

Fig. 7.



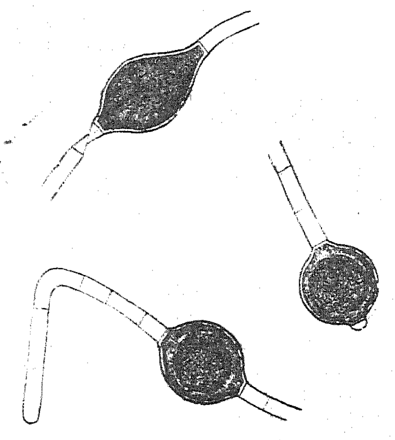
Artotrogus hydnosporus, Mont. (?), from fresh specimens. 1 and 2. From the stem of a Potato; 1875. Magn. 600 diam. 3. Common form, from a diseased tuber of 1874. Magn. 400 diam.

are sharp protuberances of the colourless, tolerably thin, external membrane. Within this is enclosed a cell, filled with closely-packed protoplasm, also of globular form, but with a smooth surface, and having the structure of a *Pythium* oospore, with thin, almost colourless epispore. The globular cells are often considerably smaller than the prickly bag which surrounds them, and then they lie loose in it, enclosed in watery liquid. In other specimens this difference of size is so slight that the prickly envelope is all but completely filled up by the smooth cell. The first of these forms in particular greatly reminds one of the oogonium of some *Saprolegnieæ* (of the genera *Saprolegnia* and *Aphanomyces*) which have prickly prominences, and contain a smooth globular oospore. In most cases I found these bodies complete, mature, and without any distinct indication of their being attached to mycelium. It was certainly remarkable that they were often situated close to the inner surface of the cell-walls in places where externally the mycelium of *Phytophthora* undoubtedly ran in the intercellular spaces, or even where a short branch of it penetrated the interior of the cell. All these phenomena were reconciled by the conjecture that the prickly bodies might perhaps be the long-sought-for oogonia of *Phytophthora*. But on the other hand they might be of quite different origin, and their former bearers or producers might have disappeared. After long searching in vain, I found in a tuber, in which they occurred along with *Pythium vexans*, an opportunity of at least partially observing their development. They grow on the extremities of the branches of a mycelium which is very like that of *P. vexans*. The extremity swells out into a globular bladder, which fills with protoplasm, is then separated from its support by a septum, and then sends out, on its entire surface, the slender prominences of the wall. These are at first flat and blunt, and then grow to be sharp prickles. The protoplasm fills them up at first, but ultimately collects itself into the smooth globule which is enclosed in a double smooth membrane. When the bodies are ripe, the mycelium cannot be detected. Though I searched diligently, I have never been able, even with approximate certainty, to discover antheridia. I have made many attempts, but in vain, to cause the prickly bodies to germinate, except in one instance, when I saw a specimen which had apparently sent out a luxuriant, repeatedly dichotomous tube. I was unable to observe its further development.

From all these observations I can determine nothing more than that the star-shaped bodies are the reproductive organs or spores of a Fungus. Their morphological value is uncertain. There is not sufficient evidence to prove that they are sexual organs or oogonia. There is no reason whatever to consider them as belonging to the Potato-fungus, unless we base it on the fact that I found them close to that Fungus in the course of experiments in search of its oospores.

It is impossible to assign its systematic position to the Fungus which bears the star-shaped bodies, owing to our defective knowledge of its development. It, however, received a name, if I am not mistaken, more than thirty years ago. In 1845, or perhaps earlier, Montagne found, in a sprouted, but not diseased, Potato, a Fungus which he called *Artotrogus hydnosporus*, and of which Mr. Berkeley* published a short description and engraving in 1846. A dried original specimen of Montagne's which I have examined presents the following characters:—On a sheet of mica is an entirely colourless section of a Potato, dried up, the walls of the cells mostly quite empty, but some still retaining starch grains. Many slender threads of Fungus, in which for the most part no distinct structure can be any longer recognised, pass through the preparation, and there are besides numerous globular bodies of two kinds abounding in protoplasm strewn over it. The one kind cannot with certainty be distinguished from those star-shaped bodies I have described, in which the prickly envelope is entirely filled by the smooth globule. They present no organic connection with the other forms of Fungus, but lie free among them. Montagne draws them as isolated organisms, both in the sketch published by Berkeley, and in another which he sent me in 1863. In the second place, the preparation exhibits globular or oval cells with very dense protoplasm, which are somewhat larger in diameter than the prickly one, and are always distinctly supported on septate Fungus threads, mostly intercalated, seldom apparently terminal. The wall of these cells is in many cases moderately thick; in others it appears to be very thick, shining, and gelatinous. The granular protoplasm is surrounded, at least in the moistened specimens, with a broad, shining, colourless border, which I can regard only as such a membrane (see Fig. 8). Montagne and Berkeley have explained the globular cells of both kinds as exhibiting progressive steps in their development, the smooth ones being the younger. For this no reason is given, nor have I found any in the renewed examination of the specimens. And one can scarcely conceive, from the known phenomena of development, how the smooth thick-walled cells could become the smaller star-shaped ones. But the fact is, that we have here two forms of Fungus, which

Fig. 8.



Smooth globules on thin mycelium threads, from Montagne's original specimen of *Artotrogus*. Magn. 375 diam.

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* "Journal of the Horticultural Society," i., p. 27, pl. 4.

are locally associated, and which were more easily confused with each other thirty years ago than appears credible to us now. The specific name *hydnosporus* shows that Montagne had drawn it chiefly from the prickly form. The other form with the smooth globules cannot at the present time be more exactly determined.

8. I had arrived at these results when the notice contributed to "Nature" (July 22, 1875), by Mr. Worthington G. Smith, on the oospores observed by him in the Potato-fungus, reached me. Afterwards I became acquainted with his publications in the "Gardeners' Chronicle," and in the "Journal of the Royal Agricultural Society" (1875), all of which I may be allowed to consider as known to my readers.

I will now confess that my reason for relating the history of *Pythium vexans* and *Artotrogus* so minutely was that I wished to show clearly, by an example, how, without the greatest care in researches of this kind, one may be led into great error, and especially in what way criticism ought to be applied in examining these observations. Let me then examine closely and critically the statements of Mr. Smith.

Mr. Smith describes two kinds of bodies. *First*, brown, warty bodies, which had been named *Protomyces* by Mr. Berkeley, and were found in the brown spots of Potato-leaves infested with Fungus. In form and size, and in the appearance of their membrane, they have a great similarity to the oospores of *Peronospora Arenariæ*, Berk. ("Nature," p. 234, fig. E, F; "Gard. Chron.," fig. 19, E) ["Journ. Bot.," 1875, p. 341, fig. 4]. On this ground the bodies were regarded as oospores of a *Peronospora*. They occur on the leaves of Potatoes, on which no other *Peronospora* is known except *P. infestans;* and mycelium occurs along with some conidiophores on the same brown spot as the warty bodies, therefore the author believes that they belong to *P. infestans*. There is no distinct evidence for this, not even if we admit that the mycelium and conidiophores in the brown spots actually belong to *P. infestans*. But fig. 19, quoted above, renders this very doubtful, since the conidiophores (F) present an important difference from those of the real *P. infestans;* and even as regards those which Mr. Smith figures in "Gard. Chron.," p. 68, fig. 9, C ["Journ. Bot.," p. 339, fig. 1], I cannot accept the accompanying statement that they are the organs mentioned as of *P. infestans*, for it is clear from the text on p. 68 of the "Gard. Chron." that author does not accurately know the conidiophores of the Potato-fungus. I cannot, therefore, hold that it has been positively proved that these warty bodies are oospores, or even that they belong to *P. infestans*. Still, it may be admitted that both these opinions may be correct. Looking still further at the author's description, I find that the bodies occurred very sparingly in the places named. But when, for the purpose of isolating them, the material was placed in water, mycelium grew and ramified luxuriantly in the rotten tissue of the Potato, and produced the numerous bodies which are described as the oogonia, antheridia, and oospores of the Potato-fungus. These are the *second* subject in the author's description. If the representations given are correct, these objects do not belong to the Potato-fungus, and cannot well be oogonia, antheridia, and oospores. I confine myself here to fig. 13, p. 69, of "Gard. Chron." [Journ. Bot., p. 340, fig 2],* for fig. 9, p. 68, of the same, and also the figure on p. 397 of the "Journal of the Royal Agricultural Society," represent things which on the face of them show that the preparation could not possibly have had the appearance given to it in the illustration. It will, therefore, be better to leave them out of consideration, especially as, in regard to the question at issue, I should adduce the same objections against them as against fig. 13.

The principal objections are the following:—Fig. 13 represents two kinds of mycelium threads—thick ones and much thinner ones—which are in *local*, but not in *anatomical* relation to each other. The extremities of the branches of both kinds support globular cells rich in protoplasm; larger ones (M) on the thick, and smaller ones (N) on the thinner threads. The former are called "oogonia"; their protoplasm afterwards withdraws from the original wall, and collects itself into a globular cell enclosed within a special membrane, the "oospore." The globular cells on the thin threads rise mostly free in the surrounding space, many even lie there separated from their pedicels; some are attached to the "oogonia," and on this account they are called "antheridia." The interpretation expressed by these names is based on their supposed similarity to the oogonia, oospores, and antheridia of other Fungi, say of *Peronospora*, which are accurately and definitely known. But on closer examination one sees that there is very little similarity. The form, perhaps the structure also, of the "oogonia" may correspond, but these are unimportant, since they suit also the reproductive cells of different morphological value, in a variety of Fungi, as already shown. The same may be said of

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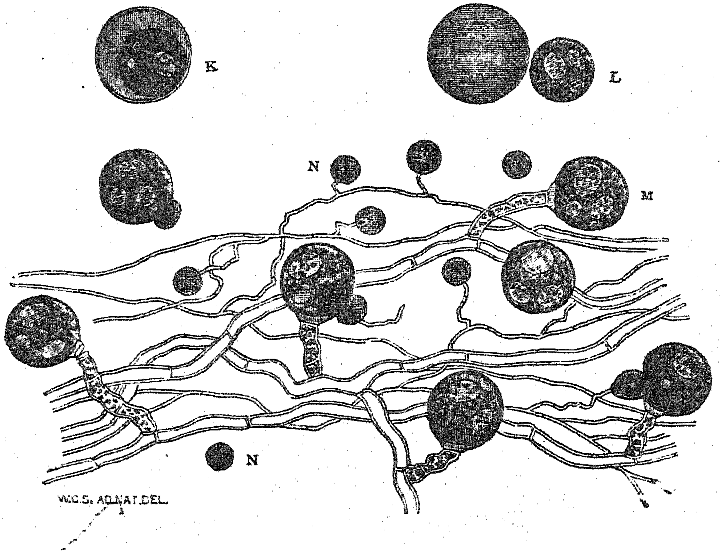
* For the convenience of our readers we here reproduce the figure in question, in order that Prof. de Bary's criticisms may be more readily followed.—[*Ed. Journ. Bot.*]



the antheridia in reference to their form; though I might object that in no known *Peronospora* or *Saprolegnia* do the antheridia possess so regular a globular form as the bodies to which this name is given in the Fungi here cited. In all known *Peronosporeæ* and *Saprolegnieæ* the antheridia are not formed until after the extremity of the branch which supports them, and from which they are afterwards separated by a septum, has attached itself to the oogonium, and this attachment takes place in the early stage of both organs. Antheridia originating freely in the surrounding space are, as regards the known forms, at least a great rarity, if indeed they ever occur, but this is a point which I will not here decide. Fig. 13 represents nine "antheridia"; of these, two are attached to the "oogonia"; five others, equally large, rise from their pedicels, and are free in the surrounding space; and two lie beside them quite free. These phenomena entirely disagree with all that is yet known of *Peronosporeæ* and *Saprolegnieæ*.

It is equally opposed to known phenomena that the "antheridia" in question originate from a mycelium which is luxuriantly ramified, and is throughout different and indeed anatomically separate from that which supports the "oogonia." It is true that the branches of *Peronosporeæ* and *Saprolegnieæ* are often of very unequal thickness, and those which support antheridia often thinner than others. But when the relation between the two kinds of branches are traced, it is found that those which support antheridia almost always develope in proximity to the insertion of the oogonia belonging to them, and consequently a special antheridian mycelium by the side of one supporting oogonia would be an unheard-of coincidence in the families in question.

One cannot, it is true, say that such phenomena are impossible in these families. They would, however, require to be regarded as peculiarities in the highest degree remarkable in the Potato-fungus if the explanation of the doubtful organs were otherwise beyond question; taken by themselves, they not only do not confirm this explanation, but go decidedly against it.

I look in vain for other reasons in support of this explanation, or to establish even its probability. Grant that those warty bodies which resemble the oospore of *P. Arenariæ* are really oospores, it was surely necessary, at the least, to give a detailed account of their development from the supposed oogonia and antheridia of the macerated preparation in order to establish the correctness of the explanation given of these doubtful bodies; but that has not been done.

I have myself endeavoured to fill up this lacuna by examining preparations of Mr. Smith's, which he has been so good as to communicate to me through Mr. Carruthers, but I have come to an opposite result. The two preparations which I examined were mounted on glass, and bore the inscription "*Peronospora infestans*, Mont. Resting-spores and oogonia." Both contain, in the liquid in which they are preserved, much granular detritus, obviously the product of the maceration of the Potato; then there are distinctly septate threads of mycelium, which, from their form, I should class with *Oidium lactis*, the more so because there likewise exist in the preparations conidia of this common mould, which also grows under water; and lastly, numerous isolated globular bladders, somewhat larger than the oogonia of

Pythium vexans. These last organisms have a moderately thick membrane, which in many cases is quite smooth, while in others the outer surface is irregular, uneven, and of a very pale brownish-yellow colour. Its protoplasm is shrivelled up into a small, round, central body, no doubt in consequence of maceration. Some of these bladders are still loosely surrounded with a very slender, irregularly folded or shrivelled membrane, which alternately approaches the bladder or retreats from it. It is only to these bladders that the terms oogonia or oospores can be applied; they have as little resemblance to the figures in "Nature" (fig. E), and in "Gard. Chron." (fig. 19, D), as to the oospores of *P. Arenariæ;* they might rather be compared with the thin-walled oospores of *Peronospora viticola*, or with those of a *Pythium*. But the preparations do not enable me to arrive at a certain result as to what they really are.

There might still be some light thrown on this subject, notwithstanding all this uncertainty, if it were established that the organs in dispute are actually developed on the mycelium of the Potato-fungus, and produced on its branches. The illustrations, however, which I have examined, show the contrary. All the threads of mycelium in fig. 13 possess numerous very regularly arranged septa. Now, it is true that septa occur in the mycelium of *P. infestans*, especially when old, but they are always isolated and very irregular. So long, also, as the threads vegetate vigorously under water, they are for the most part entirely without septa. No botanist could accept a mycelium of the structure of fig. 13 as that of a *Peronospora*, unless the clearest evidence for it were furnished from some other quarter. Further, in the preparations examined by me I found, as already stated, the globules without any connection with mycelium.

In conclusion, I will state another objection, which, no doubt, if it stood alone, would have little weight. Mr. Smith found his oospores at an advanced stage of the process of maceration and decay of the parts of the Potato in water. Now, so far as experience goes, the Potato-fungus is exceedingly sensitive of decay, for as soon as this is developed around it, it speedily dies, whether under water or in the air. But, on the other hand, it is known that many other Fungi do not begin to grow till decay has appeared.

In the view of all these considerations I may, though with many doubts, accept the warty bodies first described as perhaps the oospores of *P. infestans*, but certainly not the forms found in the macerated tubers. It however remains that Mr. Smith has described two forms of Fungus in the macerated material, both different from the Potato-fungus, and possibly also from each other. No one would have thought of associating them with the Potato-fungus had they not been found in parts of the Potato-plant when there was a great desire to discover the oospores of that parasite. To what species of Fungus the forms which are represented in the illustrations, and which occur in the preparations, belong, cannot, for the reasons already repeatedly stated, be determined; indeed, the question has no further interest for us here.

9. It is thus apparent that we are not much further advanced to-day than we were fifteen years ago in our knowledge of the morphological peculiarities of the Potato-fungus. The warty bodies are

possibly its oospores. Should this be indeed the case their appearance in the Potato-plant in Europe is nevertheless so extraordinarily rare that the question suggests itself whether they do not occur more frequently in some other nidus than the Potato-plant, or in any other climate than our own. That they will be regularly found somewhere or other is assumed, for our knowledge of the habits of numerous allied Fungi makes this more than probable. With this interrogation I leave the domain of morphology and return to the phenomena of adaptation.

As has already been said (page 112), a metœcia or heterœcia in *Phytophthora* may be considered, not indeed impossible, but highly improbable; and if it should exist, there is no indication where to look for it. On the other hand, from the analogy of other *Peronosporeæ*, the conjecture readily suggested itself that the Potato-fungus in continuing its development to completion, including the formation of oospores, may make use of some species of host other than the Potato-plant, or, if of it, perhaps in some other climate than ours. I do not exclude from this hypothesis an exceptional occurrence of oospores in our Potatoes in Europe, for we have such a case in *Cystopus cubicus*, already mentioned.

What this other presumptive and more favourable host-plant may be, I am as little able to say now as I was fifteen years ago. The Potato-fungus is often found on other species of the order *Solanaceæ* grown in gardens, but without presenting in them phenomena different from those observed when it grows on the Potato-plant; and, moreover, it is not so frequent on them as on the Potato. In *Solanum Dulcamara* (a species indigenous to the British Isles as well as to the Continent), it grows only in a starved condition; it has not yet been observed in other indigenous species. Berkeley has described a case where *Phyt. infestans* occurred on *Anthocercis viscosa*, a New Holland plant of the family of *Scrophulariaceæ*, closely related to the *Solanaceæ*. On the strength of this, one might ask whether the plant on which the Potato-fungus forms oospores may not perhaps be one of our native *Scrophulariaceæ*, say, one of the field weeds of the genus *Veronica* or *Linaria*. Special investigations in this direction, as well as the examination and comparison of the abundant material made known by the collectors of Fungi, have always yielded a purely negative result. *Phytophthora* has not been observed on any indigenous species of *Scrophulariaceæ*, while *Peronospora grisea*, Unger. (*P. sordida*, Berk.), plentiful on species of this family, is entirely different from the Potato-fungus.

(*To be concluded in the next number.*)

Botanical News.

ARTICLES IN JOURNALS.—FEBRUARY.

Annals and Mag. Nat. Hist.—M. J. Berkeley and C. E. Broome, "Notices of British Fungi" (nos. 1501-1630. Tab. 9-11).

Botanische Zeitung.—J. Reinke, "Researches on growth" (tab. 2, 3).—L. Cienkowski, "On the *Palmella*-condition of *Stygeoclonium*" (contd.).—E. Pfitzer, "On the rapidity of the flow of water in the plant."—A. Engler, "On the morphology of *Araceæ*."

Flora.—H. de Vries, "On wood-callus" (contd.).—A. de Krempelhuber, "Licheues Brasilienses" (contd.).—H. Müller, "On heliotropism."—X. Landerer, "Botanical notes from Greece."

Hedwigia.—G. Limpricht, "Silesian Hepaticæ."

Œsterr. Bot. Zeitschr.—J. E. Hibsch, "*Geum rivale* × *montanum*, a new hybrid."—C. Haussknecht, "Botanical notes."—W. O. Focke, "Is *Vitis vinifera* a species or a hybrid?"—A. Kerner, "Distribution of Hungarian plants" (contd.).—Schulzer, "On *Hyphomycetes*" (contd.).—F. Antoine, "Botany of the Vienna Exhibition" (contd.).

Botaniska Notiser (15th Feb.).—N. G. W. Lagerstedt, "Ought the name *Diatomaceæ* to be changed to *Bacillariaceæ?*—J. E. D. Iverus, "Notes on the growth of the flower-stalk of *Agapanthus umbellatus.*"—H. W. Arnell, "Localities for Scandinavian Mosses."

New Books.—J. D. Hooker, "Primer of Botany" (Macmillan, 1s.)—H. Graf v. Solms-Laubach, "Das Haustorium der Loranthaceen & der Thallus der Rafflesiaceen & Balanophoreen" (Halle, 40s.).—R. H. Alcock, "Botanical Names for English Readers" (L. Reeve.)—H. Loret & A. Barrandon, "Flore de Montpellier" (Montpellier).—E. Lindemann, "Prodromus Floræ Chersonensis" (Odessa, 1872).—Parlatore, "Flora Italiana," vol. v., pt. 2 (Florence).—J. H. Krombach, "Flore du Grand-Duché de Luxembourg; Plantes Phanérogames." (Luxemb., 1876, 8mk.).

Guadalupe Island, about 100 miles off the coast of Lower California, in lat. 29° north, was visited during the last season from February to May by Dr. Edward Palmer. No previous collection of plants had been made there, but that formed by him is as nearly complete as it was possible to make it. The number of species is 131 (102 Exogens and 8 Endogens, and 21 Ferns, Mosses, and Hepatics); of these 12 are introduced, 9 range from the Pacific to the Atlantic States, 49 are found throughout California, 18 are South Californian only, and 21 are peculiar to the island. The introduced plants are all European, and their introduction is to be traced to the Spaniards; *Erodium cicutarium* is the most abundant plant on the island. One of the novelties is a Palm, *Brahea? edulis*, conspicuous as the only representative of a tropical Flora. Mr. Sereno Watson, in his "Contributions" printed in the "Proc. Amer. Academy" for February, 1876, gives a list of the species, with descriptions of the new ones, except the Monopetalæ, which are treated by Dr. A. Gray in the following memoir.

Prof. Asa Gray's "Botanical Contributions," issued January 5, 1876, consist mainly of notes on Californian Botany, the writer having been engaged in the preparation of the Gamopetalæ for Prof. Brewer's "Botany of California," now printing. *Palmerella*, dedicated to Dr. Edward Palmer above mentioned, is a new genus of Lobeliaceæ, *Hesperelæa* of Oleaceæ, and *Harpagonella* and *Echidiocarya* of Boragineæ.

The Gault of Folkestone has afforded another Coniferous fruit, which is described by Mr. Carruthers in the "Proceedings of the Geologists' Association," under the name of *Pinites Pricei*. The Flora of the Gault, as far as at present known, consists solely of a few species of Coniferæ.

M. Cogniaux, of Brussels, who has for some time past been studying the *Cucurbitaceæ* in the great European herbaria, including those of this country, has published, in the 27th vol. of the "Mémoires couronnés" of the Belgian Academy, the commencement of his Diagnoses of new species. This first part treats only of the genus *Anguria*, of which the author constitutes 4 genera — *Anguria* proper, with 16 species (4 new); *Gurania*, with 47 species (33 new); *Dieudonnæa* (=*Anguria rhizantha*, Poepp. & Endl.) and *Helmontia*, with 2 species (1 new). The whole are tropical American.

Mr. R. A. Pryor, of Hatfield, contributes a valuable paper "On the botanical work of the past season" to the "Transactions of the Watford Natural History Society." A careful investigation of the river drainage of Hertfordshire has led the author to make considerable alterations in the districts originally proposed by Mr. Coleman, and the new limits are clearly shown by a map. The two largest river basins in the country, those of the Colne and the Lea, are divided into the basins of their tributaries, and thus are formed six districts in the former and seven in the latter. The whole number of districts made is sixteen, with an average area each of rather less than forty square miles. The body of the paper is occupied by notes on the additions to the Flora made in 1875, the segregate species observed, &c.

Dr. Engelmann's Notes on *Agave* will be found in the "Transactions of the Academy of Science of St. Louis, Missouri," for December, 1875. The memoir contains a systematic enumeration of the North American species, in which several novelties are now first described.

Baron von Mueller, in the first number of "Descriptive Notes on Papuan Plants" (1875), brought by J. Reedy, collecting for Sir W. Macarthur, from two previously unexamined localities, gives some account of several species of interest, including a new *Melaleuca* (*M. Papuana*). He remarks that the blending of Australian with Sundaic forms is a remarkable feature of the Flora of this great island, of which the mountains are likely to yield many novelties.

We are glad to see that the List of Desiderata of the Botanical Exchange Club has been issued to the members in time to enable them to use it throughout the collecting season; we hope the Report will quickly follow.

Messrs. H. O. Houghton and Co., of Boston, intend to publish a series of sketches of the wild flowers of North America, from studies by the well-known botanical artist, Mr. Isaac Sprague. Each portfolio of four coloured plates is to be accompanied by descriptive letterpress, in which the more interesting details of structure and the habits of the plants will be explained.

In his Report of the Edinburgh Botanic Garden for 1875, the Regius Keeper again urges on the notice of the Government the necessity for a curator of the herbarium and library. He states that the want of someone in constant charge is a great hardship and decided hindrance to the usefulness of the institution.

We understand that the whole of the collections of Diatoms made by the late M. de Brébisson were purchased by Prof. H. L. Smith, who has on sale series of slides authentically labelled. Many of Dr. Brébisson's species cannot otherwise be obtained. Two centuries of slides have been issued, and the third is nearly ready. Mr. Stodder, of Boston, is agent.

Original Articles.

ON *ANOMOCLADA*, A NEW GENUS OF HEPATICÆ, AND ON ITS ALLIED GENERA, *ODONTOSCHISMA* AND *ADELANTHUS*.

BY RICHARD SPRUCE, PH.D., F.R.G.S., &c.

IN August, 1852, when I was at the cataracts of Panuré, on the large river Uaupés, a few miles north of the equator, busily occupied in collecting the magnificent forest-vegetation, and not unmindful of the Cryptogamia which flourished under the shade of the trees, and chiefly on the decaying prostrate trunks of their predecessors, I fell in with a Hepatic which greatly interested me. It spread over decaying wood in broad, compact, yellow-green patches, and from its rampant habit, its postical subaphyllous rooting flagella, and the insertion and texture of its leaves, it was plainly an ally of the common *Jungermannia* (*Odontoschisma*) *Sphagni* of our boggy heaths; and the comparison was rendered easier by the fact that the very *Jungermannia Sphagni* grew close by—not on rotting wood, but at the base and on the exposed roots of growing trees—a fact the more noteworthy because it is the only instance known to me of a Moss or Hepatic abounding in the north temperate zone and also in the hot forest plains of the equator. The new species differed from the old in its larger, longer leaves, much crisped on their under edge, so that a stem, viewed from beneath, appeared crested, very much as in the cristate *Plagiochilæ* (*P. cristata, hypnoides,* &c.); and more essentially in the leafy branches and the female flowers springing from the *upper* face of the stem, and not from the *under*, as all the branches and flowers do in *Odontoschisma* and some other allied genera (whence my name for it, *Anomoclada*); but, above all, in the patches being always suffused with mucilage, which I at first took for an extraneous and probably tremelloid growth, but finding it constantly present, not only in that locality, but in many others where I found the plant during the two following years, viz., at San Carlos del Rio Negro, on the Casiquiari, the Alto Orinoco, and in the Montaña de Javita (Humboldt's "Portage of Pimichin," where I was at last fortunate enough to find it in fruit), I was forced to the conclusion that the mucus exuded from the plant itself. It did not swell out into a jelly-like mass as a Tremella would have done, but looked rather as if the plant had been liberally smeared with gum arabic by means of a brush. Although I took up, with cloths, as much of the mucus as I could, the specimens still adhered so firmly to paper, especially by their under side, as not to be detached without tearing away portions of it.

So soon as I could spare time I tried to trace this mucous secretion to its origin. In the first place, there was plainly none from the upper, but only from the under surface of the plant. What are called the rhizina, or radicles, of Hepaticæ, are capilliform, jointless tubes, proceeding in fascicles or bands from the basal cells of the postical leaves (stipules or amphigastria, as they have been called); or from the underside of the stem itself, where there are no stipules; but in plants like *Anomoclada* relegated chiefly to the flagella. In terricolous, corticolous, and foliicolous species of prostrate habit, they are often present along the whole length of the stem and branches; but in some genera (e.g., *Plagiochila*) they are almost confined to the prostrate caudex, and are normally absent from the tall, branching, erect, or pendulous stems. They vary in length from a small fraction of a millimetre in the minuter species, to several inches in the gigantic *Marchantia paleacea* of the volcanoes of the Andes. They exude mucus from their extremity (which is often clubbed, knotty, or even slightly branched), and thereby adhere to the matrix, or to whatever crosses their path. In the species of *Radula*, like *R. flaccida*, which overrun living leaves in the tropics—close allies of the *Jung. complanata*, common on the smooth bark of our trees—the rootlets spring from a conical depression on each semipostical leaf (or lobule); but very often the cones themselves adhere to the matrix by their viscid apex, without the intervention of any rootlets, and then they remind one of the *propedes* of a caterpillar. Knowing all this, I naturally turned first to the rootlets, where I found no abnormal mucosity; but I saw plainly that the mucus, which was poured out in such quantity as literally to flood the entire plant, was derived directly from the stipules, whose marginal and apical cells were continually swelling and discharging their protoplasm, adhering for a while as empty bleached bladders ($\frac{1}{30}$ millimetre in diameter), then falling away, for the succeeding cells to undergo the same process. It was not until after a long search that I found a perfect stipule, which was broadly ovate with a subulate point, and arose from a wide arcuate base, decurrent at each angle; but by this continuous disintegration the stipules are often reduced to a narrow, semilunate rim, with a more or less ragged upper edge.

The possession of this viscid secretion renders the *Anomoclada* eminently insecticidal, and it is the only Moss known to me which has that property. The dead insects I used commonly to find in it were mites, little flies, and (above all) minute spiders—which had probably been entrapped as they alighted from some overhanging branch, and on re-examining the specimens I find no others—not a single ant—whence, although I did not taste the mucus, I conclude it was not sweet, for, if it had been, some even of that sagacious tribe would have been lured to destruction. I saw no sign that the plant snared the animals for food, any more than many other insect-trappers do. On the Rio Negro the leaves of *Drosera tenella*, H.B.K., and *D. communis*, St. Hil., caught flies, rolled up over them, and doubtless digested their soluble parts before again unrolling; as has been clearly proved in the case of European species of the same genus. In a ravine on the volcano Tunguragua I gathered *Pinguicula calyptrata*, H.B.K., and noted dead flies in the inrolled margins of the leaves, just as I have often done in those of *P. vulgaris* in England; but on bushes overhanging the ravine grew a small Fern (*Elaphoglossum glutinosum*, or an allied species), whose viscid frond-stalks slew far more insects than the *Pinguicula*, with no probable benefit to the Fern. Vast numbers of tropical plants are (apparently) as uselessly insecticidal as that fern. Some of the viscid Nyctagineæ would be so stuck over and disfigured with dead flies that I have had difficulty in selecting presentable specimens. Of some large trees, every pedicel is a "limed twig," set to catch the little "winged souls." Even the consideration of the almost limitless reproductivity of Nature does not reconcile one to the wanton cruelty of this massacre of the innocents. In some cases, however, the capture of insects may subserve the fertilisation of the flowers. I have often seen flies, and even large moths, ensnared on the large peltate, or radiate, and very viscid stigma of the Guttifers (*Clusiaceæ*), and I have thought that possibly no female flower of a dioicous species of that family, especially of the genus *Clusia*, was ever fertilised without the immolation of one or more insects.

The remarkable mucosity of *Anomoclada* set me on the watch for other Hepatics similarly affected; but although I went on collecting for many years afterwards, I never met with another instance. It is common to see on many of the *Jungermanniæ* of our heaths and rocks (e.g., *ventricosa*, *exsecta*, *attenuata*, &c.)—less frequently on those of the tropics—the apical cells of the young upper leaves breaking up into what are called *gemmæ* (*gonidia*, Lindberg)—not, however, pouring out their contents in the shape of crude mucus, but previously so far organising them that when the gemmæ after awhile fall away they are capable of giving birth to a new plant. Free mucus is, indeed, found in many species at the base of the growing calyptra, both externally and internally; in the latter case it probably goes to the nourishment of the young capsule, and plainly originates in protoplasm, liberated, in the first instance, by the dissolution of the axial cells of the pistillidium, whereby the antherozoids obtain access to the interior of the latter and effect its fertilisation. In Hepatics which have no perianth, but only a large naked calyptra, this is often seen suffused with mucus up to the maturation of the fruit, as is particularly noticeable in *Symphyogyna*. My specimens of *S. Brongniartii*, Mont., have the mucus persistent even in the dried state, making the calyptra appear coated with thin parchment, and when moistened swelling out into a thick gelatinous coat, which hides the numerous minute papillæ that stud the surface of the calyptra and have probably exuded the mucus. In most tropical *Aneuræ* there is a similar mucous covering to the calyptra, which makes it difficult to separate the specimens from the drying-paper, and usually remains adhering to the calyptra in the form of shreds, which look at first sight like an exfoliating cuticle. I have no evidence of similar mucosity in European *Aneuræ*, but it probably exists, and I invite the aid of botanists to determine the actual fact.

If I found no more mucous Hepatics, I came on several which had an extraordinary power of retaining the water of rains. With the exception of a few species, all leafy Hepatics absorb moisture rapidly; but there are two groups, or subgenera, of *Lejeunea*, the species of which are nearly always seen saturated with moisture, notwithstanding that a few consecutive days of hot sunny weather—which is the nearest approach to a dry season they ever experience—may have shrivelled up most other Hepatics and Mosses in their neighbourhood.

One of these groups (*Hygrolejeunea*, mihi) consists of fine large-leaved species, such as *L. cerina*, L. et L., *L. rotundifolia*, Mitt., &c., which inhabit chiefly the slopes of the Andes, up to a great elevation, although one or two species descend into the plains; but the most curious species is one that I have called *Lejeunea Spongia*, n.sp., whose densely-packed bipinnate stems form round balls, two inches in diameter, pale-green without, white within, on the twigs of trees on Mount Tunguragua, at 2500 to 3000 metres. These vegetable sponges are so constantly full of water that I have occasionally slaked my thirst by squeezing one into my mouth; for along nearly the whole northern slope of Tunguragua there is no visible stream of fresh water, nor has there been since the great eruption of 1773, when the streams all sunk into the earth, and now burst forth at once—sometimes in considerable volume—from the cliff at the base of the mountain into the river Pastasa, which rushes down the gorge of Baños, into the forest of Canelos, and thence emerges with a placid course on the Amazonian plain.

The second hygrophorous group of *Lejeuneæ* is confined entirely to the plain, where it abounds on prostrate rotting trunks. The two groups are widely distinct in character, even the cellular structure being different, and have only in common the very pale colour when fresh—often changing to lurid brown when dry—and the densely-stratified mode of growth; the latter peculiarity being the only one I can find to account for their unwonted retentiveness of moisture.

In treating of a family which has already been elaborately studied, and has acquired a literature of its own, it is felt to be desirable to conform to the terminology sanctioned by usage, even when not always so correct and expressive as it might be; but there are cases where a departure from this principle becomes imperative, as, for instance, where the meaning attached to any term is opposed to what it bears when applied to other families of plants. The terms *dorsal* and *ventral*, as applied to Hepaticæ, is a case in point, the former having been used (first, I believe, by Nees ab Esenbeck) for the upper surface, the latter for the under surface of the stem or of the frond, in accordance with some fancied resemblance to a crawling insect. The postical leaves, which were called *stipules* by Hooker and the older authors, have been called, in conformity with this new way of looking at the plant, *amphigastria*—a notable example of the modern practice of giving a complex Greek name to a thing, and then fancying we have proved it quite distinct from whatever bears a merely vulgar name, Long years ago I pointed out to the late Dr. Taylor, of Dunkerron, how inconvenient it was to find authors speaking of *dorsal* Ferns—meaning thereby Ferns which bore their fruit on the back, or *under surface*, of the frond—and of the *back* of the stem of a *Jungermannia*, or of the *dorsal* lobe of the leaf, when they meant the *upper* surface, or *upper* lobe. He replied, "You rightly complain of this ambiguity, and the man who first called the stipules *belly-bands* (amphigastria) has much to answer for." To the end of his career he never willingly called them anything but "stipules." To take another instance of the mischief caused by this tergiversation, I have before me a large

Fern-pinna, from the cataracts of the Rio Negro, on which are growing, side by side, a fine Moss, *Hookeria Patrisiæ* Hpe., notable for the metallic green of its flattened tetrastichous leaves, and a Hepatic, *Lejeunea lunulata*, Web., of about the same size as the Moss, but of a rufous hue. The rootlets of both spring from the underside of the stem, and in both spread out into small, compact disks (haustoria) that closely adhere to the Fern, without penetrating it; yet in the Moss I am required to say they arise from the *back*, and in the Hepatic from the *belly*, of the stem; and such instances might be multiplied indefinitely. Surely it is better to revert to the usage of such eminent botanists as Hooker, Weber, Martius, &c., and call the *underside* of the stem of a Hepatic *the back*, as we do that of a Moss. Most writers call the underside of a leaf *the back*, even those who affirm the contrary of the stem, and where the two modes come into collision (as they do sometimes in the descriptions of even the accomplished authors of "Synopsis Hepaticarum") the result is rather perplexing. Besides, we are not ashamed to say, in Latin, "rami caulis ventre enati," but our English reticence obliges Dr. Carrington to use such circumlocutions as "branches springing from the ventral aspect of the stem." To avoid all misconception on this head, I do not use at all the terms *dorsal* and *ventral*, but in their stead *antical* and *postical*, in their ordinary and well-understood sense. The postical leaves I have long called, in my MSS., *foliola*, little leaves, for they are only in very rare cases as large as the lateral leaves, and are very often many times smaller; in conformity with this the postical bracts become naturally *bracteolæ*. They might be called *rhizophylla* or *rhizinophylla*, because they bear the rhizina; but it would be a needless multiplication of terms. The term *stipule* may still be used for these appendages, by those who prefer it, without any risk of being misunderstood; they are, however, by no means analogous to the stipules of flowering-plants, for intead of being normally two to each leaf they are usually only half as numerous as the leaves, and they never subtend the leaves as true stipules do.

A careful study of the stipules, or amphigastria, of Hepaticæ can lead to but one conclusion, namely, that they are truly and simply leaves, differing in no essential respect from the lateral leaves, and having their analogues in the allied family of Mosses, where it has not been found necessary to give them any special name at all. In almost any Moss with complanate foliage, e.g., in *Hypopterygium*, *Distichophyllum*, in many species of *Hookeria*, &c., the postical leaves (where they exist at all) will be found smaller, more symmetrical, and more nearly transverse in insertion than the lateral leaves, which are always more or less oblique and unequal-sided. But these are precisely the most usual points of difference between the amphigastria and the lateral leaves of a *Jungermannia*.

Having settled these essential preliminaries, I proceed to offer a detailed description of *Anomoclada*.

ANOMOCLADA, *Spruce*, gen. nov.

Plantæ lignicolæ, mucosæ, dense depresso-cæspitosæ, serpentino-reptantes, ramos foliosos floresque femineos e caulis facie antica

media, radicelliferos (flagella) e postica, proferentes. *Folia* magna, succuba, basi obliqua inserta, assurgentia, apice decurva, subtus crispula, integra, celluloso-erosula; cellulæ mediocres pellucidæ incrassatæ. *Foliola* ubique præsentia parvula integra in mucum plus minus dissoluta. *Flores* dioici: ♀ ramulo brevi proprio antico constantes; *bracteæ* tristichæ, trijugæ, bifidæ, tres intimæ basi perianthio leviter adnatæ, duæ anticæ connatæ. *Pistillidia* circiter 20. *Perianthia* magna anguste fusiformia trigona, ore subincisa. *Calyptra* parva tenuis. *Capsula* magna, valida, ab ipsa basi 4-valvis. *Elateres* elongati subattenuati bispiri decidui. Sporæ minutissimæ. *Flores masculi* ignoti.

Anomoclada ab *Odontoschismate*, genere proximo, caracteribus sequentibus differt:

In *Anomoclada*,	In *Odontoschismate*,
Rami radicelliferi *postici*, foliosi tamen floriferique e facie caulis *antica* orti;	*Rami* omnes—foliosi, floriferi et radicelliferi—e facie caulis *postica* orti;
Folia convexa, insigniter crispata, cellulis pellucidis;	*Folia* concava, haud crispata, cellulis ex endochromio copiosiore subopacis;
Bracteæ tres intimæ basi ipsissima perianthio adnatæ, earum duæ antico-laterales altiuscule connatæ.	*Bracteæ* inter se necnon a perianthio liberæ.

1. ANOMOCLADA MUCOSA, *Spruce*.

Hab. in sylvis fluviorum Negro, Uaupés, Casiquiari et Atabapo primævis, ad truncos prostratos putrescentes, sæpe aliis Hepaticis Muscisque irrepentes.

*Folia 1·5 × 1·3, 2·0 × 1·5; cellulæ $\frac{1}{30}$; foliola ·25 longa; bracteæ internæ 1·1 × 0·4, 1·6 × 0·5; perianthia 4·0 × 0·5; calyptra 1·1 × 0·6; stylus ·2; capsula 1·1 × 0·5; pedicelli sectio ·35 × ·3; elateres ·4; sporæ $\frac{1}{150}$ mm.

Cæspites lati depressi, albido-virides vel flavescentes, semper liquore mucoso suffusi. *Caules* 1-3-pollicares albidi tenaces teretes, cellulis pluristratis opacis, corticalibus cæteris vix paulo latioribus, conflati; basi brevi spatio radicellis flagellisque rhizophoris repentes, foliis marcidis vestiti vel subnudi; dein a matrice liberi, arcuantes, densifolii, subtus radicelliferi nudive, statim devexi

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* I prefer to preface my description of the species by the dimensions of the parts in millimetres, having found by experience how greatly it aids a thorough comprehension of the characters.

Magnitudo cellularum, omnibus Hepaticis mihi cognitis sedulo comparatis, ad hunc modum æstimanda:

Cellulæ	magnæ	$\frac{1}{10}$ mm.	diametro.
,,	majusculæ	$\frac{1}{20}$ mm.	,,
,,	mediocres	$\frac{1}{30}$ mm.	,,
,,	parvulæ	$\frac{1}{40}$ mm.	,,
,,	parvæ	$\frac{1}{50}$ mm.	,,
,,	minutulæ	$\frac{1}{60}$ mm.	,,
,,	minutæ	$\frac{1}{70}$ mm.	,,
,,	minutissimæ	$\frac{1}{80}$—$\frac{1}{100}$ mm.	,,

facieque postica flagella solitaria fasciculatave, valida, albida, subramosa, radicellis tenuissimis flexuosis villosa, demittentes; postea iterum assurgentes arcuantes radicantesque, apice plerumque liberi foliosi, raro attenuati subaphylli radicelliferi; facie antica ramos paucos assurgenti-arcuantes simplices vel ad caulis instar ramosos flagelliferosque proferentes. *Flagella* nodulis minutis conicis tristichis distantibus (foliis rudimentariis) basi externa radicelliferis obsita; noduli flagellorum apicem versus obsoleti, radicellæ copiosiores evadunt.

Folia valida nitida succuba, alterna vel per paria subapproximata, plus minus assurgentia, interdum secunda, undulato-convexa, apice decurvula, ad lineam obliquam angulum 30° cum caule efformantem lata basi inserta, late oblique ovato-ligulata, rotundato truncata, sæpe retusa, raro subemarginata, medio margine utrinque recurva exindeque panduriformia, basi postica semicordata ibidemque sæpe tam gibba crispato-sinuataque ut caulis a postero visus cristatus videretur (ad *Plagiochilæ cristatæ* instar); *cellulæ* mediocres subconformes pellucidæ, pulchre guttulatæ, ovali-hexagonæ, pachydermes, ad angulos insigniter incrassatæ, intus 6-sinuatæ, endochromio parco in sicco sæpius in cellulæ ambitu coacervato, extus perpaulo prominulæ, lævissimæ.

Foliola dissita foliis 6-8-plo breviora, patentia, lata basi utrinque decurrente inserta, late ovata, in acumen subulamve brevem producta; inferiora plerumque tota fere in mucum soluta, itaque ad limbum angustum semilunatum redacta; superiora vix unquam perfecta, sed e margine apiceque plus minus dissolutis nunc irregulariter bifida, nunc quadrifida v. digitatim multifida, sæpius tamen eroso-lacera videnda. *Radicellæ* apice clavato-nodosæ, rarius subdivisæ, e foliolorum basi raro proferuntur.

Flores dioici: ♀ ramulo brevissimo caulis facie antica medium versus oriundo constantes. *Bracteæ* trijugæ, tristichæ, infimæ minutæ subbifidæ; supremæ foliis subæquilongæ, perianthii basi leviter adnatæ, a basi oblonga vaginante recurvo-squarrosæ, ad medium bifidæ, laciniis subacuminatis varie tortis angulatis subincisisve, duæ anteriores plus minus alte connatæ, tertia postica (bracteolave) paulo angustior libera; bracteæ mediæ supremis sat minores minusque incisæ; omnes bracteæ pellucidæ elongate areolatæ.

Perianthia foliis fere 3-plo longiora, albida, pellucida, anguste trigono-fusiformia, 8-plo longiora quam lata, superne obtuse triplicata, ore constricto breviter obsoleteve incisa, lævissima, demum infra medium compresso-teretia, cellulis subrectangularibus conflata. *Calyptra* perianthio fere 4-plo brevior, pyriformis, tenuis (e cellularum strato unico) basi ipsa pistillidiis sterilibus sub 20 circumdata, apice demum irregulariter bilabiatim rupta, labio altero stylo persistente rostellato. *Capsula* magna calyptræ æquilonga, nigra, cylindrico-oblonga, stratis cellularum duobus constans, demum ab ipsa basi 4-valvis, pedicello valido suffulta. *Elateres* badii, elongati, tenues, utrinque perpaulo attenuati, spira duplice præditi, decidui. *Sporæ* minutissimæ læves nucleatæ.

It is easily seen that the most important character of *Anomoclada* is the antical insertion of the female flowers and leafy branches: it is

indeed unique among the whole of the foliose *Jungermannideæ;* but I have satisfied myself, by the most scrupulous examination, of its exactness and constancy, for the stem is continued beneath the origin of the branches without any break, and does not turn up to become the axis of the inflorescence, then start off anew as an innovation, *i.e.*, as a distinct branch in very nearly the same direction as the stem, which is the ordinary structure in many *apparently* lateral inflorescences. Among the frondose *Jungermannideæ* and the *Marchantiaceæ*, female flowers springing from the upper side of the costa are not so infrequent; e.g. (in the former) in *Symphyogyna*, *Mörkia*, *Pallavicinia*, Gray (*Blyttia*, Endl., Syn. Hep.); (in the latter) in *Aitonia*, Forst. (*Plagiochasma*, N., Syn. Hep.), and *Clevea*, Lindberg; and all the three genera of *Anthoceroteæ* (not so widely apart from *Jungermannideæ* as commonly supposed) have antical ♀ flowers. In *Symphyogyna* the twin cord of opaque ligneous tissue, in the axis of the pellucid costa, allows us to easily trace the continuity of the costa beneath the origin of the ♀ flowers. The same thing equally exists in *Pallavicinia*, but is not so obvious, and although I gathered numerous fruiting specimens of *P. Lyelli*, Hook., in the Peruvian Andes, I cannot find among them a single instance of the "involucrum primo *terminale*, dein ad speciem dorsale," which is part of the generic character in "Synopsis Hepaticarum" (p. 474). Such a terminal inflorescence may exist, but it must be very exceptional; on the other hand, very young ♀ flowers may be seen springing forth from the middle of the upper surface of full-grown fronds—sometimes two or three contemporaneously—at short distances apart.

In ♀ flowers of these two genera, and of *Mörkia*, that have remained unfertilised, the involucres are sometimes abnormally enlarged, and enable us to see that their structure is really not very different from that of *Anomoclada*, consisting as they do of two or three rows of tristichous bifid bracts, whose form is often obscured in the fertilised flowers by those of the inner row becoming connate, and the lobes again cloven or toothed, and by those of the outer row adhering to them in the form of scales or wings. There is not, however, any near affinity of *Anomoclada* to any of these genera, as every skilled hepaticologist will readily see, so that it is needless to point out the differences. The frondose character is really, by itself, of slight import, as its transition into the foliose is easily traceable. In some frondose species the frond seems a direct extension of the prothallium, the only difference being that in the frond there is a more or less distinct separation into costa and pagina—a midrib bordered on each side by a thin flat foliaceous wing. In the fronds of some species the margin is unbroken, but in *Symphyogyna sinuata*, Sw., the pagina is sinuato-pinatifid, and in *S. Brongniartii*, Mont., pinnatipartite—sometimes almost down to the midrib. The next stage in the process of transmuting frond into leaves is afforded by *Cephalozia integrifolia*, n.sp., which has ovate-oblong subcontiguous leaves, inserted almost parallel to the axis of the stem, or with the slightest appreciable inclination; and very rarely a few consecutive leaves are reunited into a continuous pinnatifid pagina, simulating that of the *Symphyogynæ*. In other species of *Cephalozia* each leaf becomes more or less deeply bifid, which is the normal condition of the species of this genus.

(*To be continued.*)

LES ROSES DES ALPES MARITIMES.

Par le Dr. H. Christ à Bâle.

Monsieur Emile Burnat, l'infatigable explorateur des Alpes Maritimes, et dont nous attendons avec impatience une Flore de ce pays si remarquable par son climat particulier, a bien voulu collecter, pendant l'été 1875, toutes les formes de Rosiers qu'il pouvait trouver dans ses nombreuses herborisations. En examinant cette belle récolte, j'étais frappé du caractère tout exceptionnel de ces Roses, appartenant pourtant à des groupes fort divers. Toutes, Canines, Rubigineuses, Sepiacées, portent le cachet incontestable du climat méridional, sec, ensoleillé de ces vallées rocheuses; on dirait que le mistral avec son souffle desséchant a raccourci les organes foliacés, que l'insolation ardente et prolongée a développé au plus haut degré la glandulosité, et que la sècheresse combinée avec la chaleur a réduit la corolle et a fait naître de l'épiderme de toute la plante cette quantité prodigieuse l'aiguillons longs, luisants, effilés, en forme de faux et de sabres qui donnent à ces Rosiers l'aspect étrange d'un buisson épineux du Désert. Ce qui est tout aussi remarquable, c'est que la sècheresse de la basse région produit, dans quelques Canines (*canina suffulta, dumetorum capitata*) l'effet de raccourcir l'inflorescence tout aussi bien que les influences de la montagne amènent cette réduction dans les *coriifolia* et *Reuteri*.

Ajoutons que cette collection provient d'un territoire à peu près vierge quant à la Rhodologie; quoique les versants Sud et Est des Alpes Maritimes soient très-exploités pour le gros des Phanérogames, personne ou à peu près n'a songé, jusqu'ici, à rechercher avec soin les formes des Rosiers. L'énumeration donnée par Ardoino dans la "Flore des Alpes Maritimes," 1867, n'a pas le but d'entrer dans les détails de ce genre et se contente de courtes diagnoses des formes les plus généralement connues. Il est donc d'un haut intérêt de jeter un coup d'œil sur ces formes méridionales, toutes appauvries et petites en comparison des Rosiers si luxuriants de nos parages, mais d'une originalité saisissante.

Ce qui nous frappe tout d'abord, c'est le manque des Tomenteuses, groupe essentiellement cisalpin, à feuillage large et tendre, qui n'entre guère dans la région des Oliviers, et que je n'ai vu d'Italie que des vallées bien ombragées de la Toscane.

Les *Caninæ pilosæ* ne sont représentées qu'en peu de formes, les *Trachyphylleæ* (*Jundzilliana*, Bess., etc.) n'ont pas été trouvées encore.

Les groups dominants, comme on pouvait prévoir, sont les *Sepiacées*, et cette tribu trop peu connue des *Hispanicæ* (*Pouzini*, Tratt., etc.) qui prend, dans ces parages, un développement remarquable, et nous montre des formes du midi de l'Espagne (*Nevadensis*) et d'Italie (*Seraphini*), pour la première fois constatées en France. Ce n'est qu'à la montagne, dans les régions sousalpines, qu'on rencontre les Canines montagneuses, puis le *pomifera*, Rosier caractéristique des grandes Alpes, et certains Alpines fort curieux.

Dans les parties basses, c'est le charmant *sempervirens*, L., qui se mêle à la flore semi-Africaine du littoral, et le beau *Provincialis*,

semblable à une plante cultivée ou échappée des jardins, vient embellir les collines du Luc.

Je donne ici, en latin, pour être plus généralement compris, mes observations et les diagnoses de ces Rosiers des Alpes Maritimes.

I. Pimpinelleæ.

1. *R. alpina*, L.

Forma typicæ proxima, sed recedens pedunculis brevissimis, receptaculum floriferum æquantibus, sepalis apice vix dilatatis, pilisque numerosis per petiolum nervosque subfoliares sparsis.

Pedunculus receptaculumque aciculis glanduliferis horrent. Corolla læte purpurea.

Loc.—Vallée supérieure de la Gordolasca, à env. 1700m. alt. s. m., 27 Juin, 1875, florens.

2. *R. rubella*, Smith, f. *mediterranea.*

Forma valde insignis, verosimiliter *Rosæ rubellæ*, H. Ardoino, Flor. Alp. Marit., 129 synonyma.

Medium tenet inter *rubellam*, Smithii, *alpinamque*, L., sed priori magis propinqua.

Frutex ½ metr. altit. simplex, rectissimus; epidermide violacea aculeis acicularibus tenuissimis ad basin non dilatatis setisque dense tecta; ramulis crebris floriferis unifloris aciculis longissimis armatis; foliis quadrijugis, stipulis infra linearibus, supra in auriculas lanceolatas angustas sensim dilatatis, ita ut stipularum in primis superiorum forma potius ista *R. rubellæ* aut *spinosissimæ*, quam *alpinæ*. Stipularum laminæ eglandulosæ, margines solummodo glanduloso-ciliatæ. Petiolus tenuissimus, glandulis stipitatis aciculisque curvis parce, pilis longis crebre vestitus; foliolis anguste ovatis acuminatis parvis (magnitudine *myriacanthæ*, DC.) supra glabris virido-rufescentibus, *infra et in margine pilis splendentibus mollibus longissimis tectis*, profunde angusteque subsimpliciter dentatis, dentibus vix glandulosis. Bracteis nullis aut rarissimis lanceolatis. Pedunculis receptaculum floriferum parum superantibus lævissimis. Recept. sepalisque lævissimis, hisce etiam in margine eglandulosis, sed tomento albo insignibus. Sepalis acumine simplici longissimo lineari haud foliaceo terminatis. Corolla magna albo-rosea, striis purpureis irregulariter notata. Styli albo-tomentosi breves. Fructus adhuc ignotus.

Tota planta violaceo cruore subfusa, habitu *R. alpinæ* sed omnibus partibus multo minor, vellere nitidulo in genere singularis.

Loc.—Versant nord du Mont Cheiron, au dessus du Poux, vallée de l'Esteron, 28 Mai, 1875, vix florens, en société des *Senecio Gerardi*, *Plantago argentea*, etc.

II. Villosæ.

3. *R. pomifera*, Herrm., f. *Grenierii*, Deséglise.

Cum speciminibus Valesiacis Sabaudis Pedemontanis ad amussim congrua.

Loc.—Extrem. sup. du val Pesio, 14 Aug. 1874. Près Molières, bassin de la Tinée, env. 1600 m. alt. s. m., 13 Juill., 1875. Colle di S. Martino, entre Valdeblora et S. Martino Lantosca, 4 Juill., 1875, florens.

4. *R. pomifera*, Herrm., f. *Gaudini*, Puget, in Deségl. Nov. Sect. Toment., 47, et Bullet. Soc. Murithienne iii., fasc. pag. 53.

Recedens a typo foliolis glabrescentibus, ita ut nervi subfoliares distinctissime conspicui e parenchymate emergant, glandulisque creberrimis, etiam folioli paginam superiorem sæpius ornantibus.

Loc.—Env. de Caussols, sur Grasse, leg. Consolat, 26 Juin, 1873.

III. Rubiginosæ.

Prostat forma mirum in modum stirpium Liguriæ rupestris siccæque indolem præbens:

5. *R. rubiginosa*, L., f. *pulvinaris*.

Recedens a typo partibus omnibus ad *Rosæ Seraphini* dimensiones reductis, frutice parvulo, ramulis confertis diffusis fere pulvinaribus cortice e fusco albicante, aculeis maximis sæpius verticillatis falcato-incurvis sensim ad basin dilatatis, hic illic aculeis minutis rectiusculis interjectis, foliolis latissime obovatis, æque ac petiolus dense villosulis, pagina inferiore densissime glanduliferis; serratura typica; pedunculis hispidis receptaculo longioribus, floribus solitariis, sepalis dorso glandulosis pinnatifidis appendiculis lineari-lanceolatis brevibus, receptaculo nudo, corolla vix 20 aut 25 millim. diametro metiente, rosea, stylis brevissimis parce hispidis. Fructu lævi magnitudine pisi, ovatis.

Loc.—Val Castiglione à environ ¾ h. au dessus d'Isola, bassin de la Tinée, 14 Juill., 1875, florens.

6. *R. micrantha*, Smith, f. *pedunculo glabro*.

Pedunculo sepalorum nec non receptaculo florali nudis i.e. eglandulosis a typo recedens. Prostat simillima ex Anglia leg. Archer Webb.

Loc.—Vallée de Clanzo, extr. supérieure, près Santa Anna, alt. env. 1400 m. s. m., 1 Juill., 1875.

7. *R. micranth.*, Sm., f. *Hystrix*, Léman., syn. *Lemanii*, Bor., Ardoino, Fl. Alp. Marit, 128.

Recedens glabritie omnium partium, foliolisque angustioribus, sæpe cuneatis.

Loc.—St. Martin Lantosque, 30 Juin, 1875.

IV. Hispanicæ.

Micranthis non addicenda, sed, in sectione principali Rubiginearum, micranthis coordinanda est subsectio *Hispanicarum* (Christ in "Flora," 1873).

Ecce typus plene mediterraneus, Alpium tractum non transiens, vix usque ad Valesiam Tyroliamque austro-orientalem adscendens, sed secus maris mediterranei plagas variis formis fere ubique emergens.

Differt a micranthis aculeis in genere quam maxime evolutis, creberrimis, sæpe verticillatis ramulosque densissime obtegentibus, politis, elongatis drepaniformibus, testaceis; differt glabritie omnium partium, ita ut vix hinc inde pili in nervis subfoliaribus petiolisque appareant; differt porro foliolis parvis, lucidis, coriaceo-rigidulis, profunde et peculiari modo flexuoso-dentatis, denticulis adventiciis creberrimis; differt glandulis subfoliaribus irregulariter per folioli laminam sparsis, sæpe deficientibus; differt stylis glabris brevissimis, corollis minimis.

Tota plantarum istarum facies concinna, siccitate aëris depauperata, aculearum solummodo vi copiaque insignis.

Typus a formis aliquot extremis (*Spina flava*, *Nevadensi*) ad formas minus determinatas (*Pouzini*, *Florentinam*) transit sensimque caninis appropinqua.

De formis Italis Helveticisque hujus typi in Diario Flora 1873, 1874, n. 13, longius disserui; hoc loco Burnati messem Ligusticam compulsemus.

8. *R. Hispanica*, Boiss. Reut., f *Nevadensis*, Boiss. Pugill., 44 (1852): "Foliola ad serraturas glandulosa, laciniæ calycinæ vix appendiculatæ." Videtur frutex humilis, concinnus, aculeis lucentibus validissimis, testaceo-purpurascentibus, etiam ramulos florigeros densissima armatura tegentibus, interstitia interfoliaria omnino occupantibus, petalis glandulosis parce pilosiusculis, stipulis angustis, foliolis minutis, glabris sive parce pilosulis, lanceolato-obovatis, serraturis porrectis profundis, denticulis glanduliferis, glandulis subfoliaribus rubris frequentissimis (modo *Rosæ Sepium* aut *graveolentis*), corymbis multifloris, bracteis lineari-lanceolatis, vix foliaceis, floribus minutis, pedunculis receptaculo longioribus nudis aut parce hispidis, receptaculis ovalibus, nudis, sepalis angustis *longissime filiformi-acuminatis, parce appendiculatis, appendiculis filiformibus brevibus*, corollis albis, vix roseis, stylis vix e disco emergentibus glabris.

Tota planta purpureo colore subfusa, elegantissima. Præclara stirps, a cl. Boissiero in Monte Sierra Nevada detecta, nunc a Burnato in Alpibus Maritimis reperta, cœli Bætici Ligusticique simillimam indolem egregie demonstrans.

Loc.—Vallon de Nanduebis, près de St. Martin Lantosque, 12 Juill., 1875, florens. Vallée inférieure de la Gordolasca, 27 Juin, 1875, florens, foliis tantummodo cuneatis, idcirco *Rm. Sepium* minutam facie referens.

9. *R. Hispanica*, Boiss., f. *Pouzini*, Tratt.

Foliolis *infra eglandulosis*, majoribus (parvam caninam æquantibus), pedunculis hispidis, corollis roseis.

Loc.—Vallée de Clanzo, extr. supér., près de Santa Anna, arbrisseau de 2 m. 50 cent. haut, grèle, alt. env. 1400 m. s. m., 1 Juill., 1875, florens. Entre Gilette et Revest, près de 600 m. s. m. vall. de l'Esteron, 16 Juin., florens.

Observatio.—Sunt, qui hancce formam ob foliola eglandulosa caninis adnumerandum censent (Crépin Primit., 52) sed foliolorum serratura, aculeorum forma, inflorescentia hispida plantam eo magis Rubigineis addicunt, quo etiam foliolorum pagina inferior sæpissime in eodem frutice glandulis gaudeat et careat, quod Italiæ Valesiacæque formæ abunde probant.

Propius quam priores ad *micrantham*, Sm., accedit, sed adhuc Hispanicarum subsectioni attribuenda sequens:

10. *R. Hispanica*. Boiss., f. *viscida*, Puget apud Crép., Primit. Mon. Ros. i., 20; Ardoino, Fl. Alp. Marit., 128; syn. *R. viscidula* Gren., in litt. apud Bouvier, Roses des Alpes, 43.

Aculeis brevioribus quam in præcedentibus, inflorescentia aciculis rectis fortibus sæpe glanduligeris hispidissima, aciculis e pedunculis secus ramulos ad truncos sensim decedentibus ideoque frutex heteracanthus. Petiolis laminisque foliolorum inferioribus glabris aut parcis pilis adspersis; foliolis rotundato-ovatis, quam in præcedentibus majoribus, serratura minus arguta, sed breviori, obtusiori, *Ræ. micranthæ* simili! Glandulis subfoliaribus creberrimis. Petiolis leviter aciculatis, glandulosis. Pedunculis longis, receptaculo florifero ovato aculeato-hispido, sepala appendiculis latis dentatis foliaceis instructa, dorso glandulosa, reflexa, stylis glabris, sed eminentibus. Corolla parva, læte rosea. Fructus versus apicem in collum brevem contractus, ovato-rotundatis. Foliolorum forma, serratura obtusiore, stylo longiore ad *R. micrantham* vergens, heteracanthia a typo recedens, sed etiam *R. Hispanica Escurialensis*, Boiss. Pugill., quam in horto colui turionibus hornotinis heteracanthis gaudet!

Planta jam ab Ardoino citata in ditione haud infrequens videtur.

Loc.—Près de l'Escarène, fréquente, 11 Juin, in flore; 27 Juill., fructu immaturo. Au dessus de St. Sauveur, vall. de la Tinée, 2 Juill., florens. Près Jouet de Beuil, vall. du Var, env. 340 m. alt. s. m., 17 Juin, in flore. Etiam in Sabaudia Helvetiæ proxima: Chavanod près Annecy, Auseilles a Bouvier citata.

Ludit foliolis minoribus, aculeis validis, falcatis, crebris, ideoque *R. Hispanicæ* typicæ magis propinqua.

Loc.—Entre St. Laurent du Var et St. Martin du Var, 26 Mai, 1875, florens. Mont Farghet, près Jouette de l'Escarène, 11 Juin, 1875, florens.

Forma nana æque Sepiaceis ac Tomentellis affinis, habitu Hispanicis comparanda est:

Rosa Seraphini, Viviani, quam e Corsica, ex Italia continentali (Apennino di Lucca, di Pistoja) e Sierra Nevada, e Siciliæ Nebrodibus novimus, nunc etiam Alpium Maritimarum civis recipienda est. Specimina a Burnato lecta:

11. *R. Seraphini*, Viv., f. *Ligustica*, recedunt a typo Italico aculeis uncinatis prædito aculeis rectissimis aut rectiusculis tenuibus, foliolis in turionibus nummulariis in ramis florigeris obovato-rotundatis, late aperteque dentatis, stylis villosis.

Loc.—Près Spisios au dessous du val Longon, massif du Mont Meunier, env. de St. Sauveur, à env. 1700 m. s. m., 3 Juill., 1875, florens arbuste bas de 0 m. 50 à 0 m. 70, très-abondant.

V. SEPIACEÆ.

Abundant formæ hujus tribus, parum inter se distantes, imprimis

12. *R. sepium*, Thuillier, f. *typica*.

Sepalis tenuissime appendiculatis, longissimis, stylis glabris aut parcissime pilosiusculis, eminentibus, foliolis petiolisque pilis expertibus, foliolis anguste lanceolatis cuneatis grande dentatis.

Loc.—Ex. gr. entre Gilette et Revest, alt. 5 à 600 m. s. m., vallée de l'Esteron, 16 Juin, 1875, florens. Entre la Riviera et Duranus, route de Nice à Lantosque, 27 Juill., 1875, deflorata.

13. *R. sepium*, Th., f. *agrestis*, Savi. Eadem, sed omnibus partibus duplo minor, aculeis curtis rectiusculis.

Loc.—Vallée inférieure de la Gordolasca, 27 Juin, 1875, florens.

14. *R. sepium*, Th., f. *robusta*, Christ, Rosen d. Schweiz, 117.

Maxima, foliolis latioribus, approximatis, magnitudine Caninæ, corymbis 3 et 4 floris, stylis mediocriter pilosis.

Loc.—Entre Duranus et la Riviera, route de Nice à Lantosque, 27 Juill., 1875, deflorata.

R. graveolens, Grenier, Fl. Jur., 248.

Stylis tomentosis in capitulum magnum coarctatis a præcedenti specie diversa.

15. *R. graveolens*, Gr., f. *Jordani*, Deségl

Glabritie i.e. pilis deficientibus insignis. Ardoino, Fl. Alp. Marit., 128.

Loc.—Près le Chaudan, ravins, gorges de la Vésubie, alt. env. 300 m. s. m. 15 Juin, 1875, deflorata.

16. *R. graveolens*, Gr., f. *Lugdunensis*, Deségl.

Indumento spisso griseo, pilis brevissimis constituto diversa, foliolis obtusis serratura evanida ad f. *Billetii*, Puget, accedens.

Loc.—Entre Levens et Duranus, vis-à-vis le Cros d'Utelle, 21 Mai, 1875, florens.

Adest modificatio glandulis creberrimis *suprafoliaribus* singularis, foliolis minutis: *Loc.*—Entre la Bastide de Poux et Sigale, vall. de l'Esteron, 29 Mai, 1875, florens.

(*To be continued.*)

ON UTRICULARIA NEGLECTA, *Lehmann*: AND ON U. BREMII, *Heer*, AS A BRITISH PLANT.

By Fred. M. Webb.

On the 13th of September last, when botanising over the tract of low ground that lies to the north of Faversham, called Ham Marshes and Ore Stray, I found at its north-west corner, in the broad dike that passes along the inland side of the "sea-wall," a flowering Bladderwort, which, at the first glance, I perceived was a distinct plant to that I was acquainted with under the name of *Utricularia vulgaris*. The allied species, *U. neglecta*, of course suggested itself, and afterwards finding the specimens fairly accorded with the description of that species in Babington's "Manual," I so named them, and gave them away as such.*

The mere discovery of a new locality for *U. neglecta* I should hardly have thought it worth while to make special notice of in the "Journal of Botany." I did on this occasion what I have been in the habit of doing in similar cases, namely, furnished a specimen to Mr. Watson, with the necessary particulars for his use, and in his good hands should have let the matter rest. In the present instance, however, it interested me to use a subsequent opportunity for investigating what we had on record about the species in question as a constituent of our Flora, and as I believe that in so doing I have met with British specimens of another recognised Continental species of the genus, I will now let a (perhaps premature) notice of the latter carry along with it an epitome of the existing information concerning the former as a British plant. I employ the qualifying words "perhaps premature" from the difficulty that it will be readily appreciated must attach to absolute identification when comparing dried specimens of the delicate portions of such plants as *Utricularia*, especially when the specimens are old, glued down, and not over carefully prepared originally. I have used as much care as I am capable of using, and in favour of my conclusion have the confirmatory opinion of Mr. J. G. Baker. At any rate, I have this confidence, that I prefer to take the risk of a botanical "mare's-nest," rather than let the matter lie in abeyance without any prospect on my individual part of being able to search further into it. The present notice may put others on the track, and I am sure additional good will issue from my remarks, should they only incite a closer examination of our water-plants, conspicuous and inconspicuous, during the coming botanical season.

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* It is perhaps noteworthy that no *Utricularia* is mentioned as a Faversham plant in Jacobs' "Flora" (1777), or in that of Cowell (1839), or in the Faversham list published by Rev. H. A. Stowell in the "Phytologist" for 1856-7. The only printed reference I am aware of to any of the genus as occurring in that neighbourhood is a query regarding *U. minor* by Dr. M. T. Masters in Phyt. n.s., i, 157.

In the first edition of his "Manual" (1843) *Utricularia neglecta* was one of those plants sagaciously pointed out by Mr. Babington as likely to be found with us if searched for. This hint was continued in the two following editions, and in ed. iv. (1856), although the plant continues in square brackets, denoting no legitimate position in the Flora, the words "apparently a native of the Fen country" are added. In the succeeding edition of six years later, this statement is exchanged for the words "may occur," and no mention is made of the plant in his "Flora of Cambridgeshire" (1860). Between the dates of these editions, Mr. Gibson's "Flora of Essex" was completed and published, in which is a note under *U. vulgaris*, that "*U. neglecta*, Lehm., has been confounded with this and should be looked for." Whether the writer means that the plant has been confounded by British botanists, or by those of the Continent, or by both, is not clear. If by the first-named, I presume he excluded "the Fen country" locality, as that was the only one that had been suggested, and on the strength of it considered the extension into Essex probable. The first substantial statement of the occurrence of the species in England was made in 1867, in an editorial communication to "Journal of Botany," vol. v., p. 73, viz., "We have been shown a specimen of this plant in the herbarium of the British Museum, collected by the late Ed. Forster, in a gravel-pit in Henhault Forest, Essex." The sheet of specimens here referred to bears the pencil name "*U. neglecta?*" in the handwriting of the Rev. W. W. Newbould. Early in this same year (April 1867) the part of "English Botany" containing *Lentibulariaceæ* was published, in which Mr. Syme mentions the above locality, and names another in the same county, from a specimen he possessed, collected, in 1837 by Mr. Wallis (as *U. vulgaris*—fide Proc. of Botanical Society (1839), p. 37). Both these Essex stations are duly quoted in the 6th ed. of Prof. Babington's "Manual," also issued in 1867, and later on in that year Mr. Wintle records the plant from the Gloucester and Berkeley Canal ("Journal of Botany," v. 279). These three localities are not added to in the last edition of the "Manual" (1874). Perhaps it was overlooked that in the meantime Mr. Watson had stated in the "Comp. Cyb. Brit." regarding our plant, that, "naming by the elongate and nearly erect pedicels, examples are preserved in my herbarium from

Sussex, Surrey, Notts; perhaps, also (judging by the smaller bladders), from Hants, Suffolk, Norfolk; all of them formerly labelled as *vulgaris*" (p. 549). Supposing the highly probable supposition that the six counties thus enumerated by Mr. Watson all produce *U. neglecta* (and his marks of distinction are so apt that from him, short as they are, this is not venturesome), we have eight counties in southern England from which it stands recorded up to 1870. To these may now be added Cornwall and Kent. The former I obtain from Mr. Darwin's "Insectivorous Plants,"* and I believe, too, that Mr. Blow showed me a Record Club specimen from that county which was this species: the latter (Kent) is based upon what I stated at the commencement of these remarks. I have further seen a poorish specimen from as far north as Lancashire that I incline to put here rather than to *vulgaris*; and it may be worth while to note that there is a fine specimen from a third Essex locality in the British Museum Herbarium, from the old collection of (Sir) John Hill. This gives definite records for three of Mr. Gibson's botanical divisions of that county.

Some young botanists may wish to inquire whether the two allied species are difficult to distinguish, and I would say, in anticipation, certainly not. I do not see how they can be confounded in fair-grown living plants, nor yet in decently dried specimens. As usual the description and contrasting points, as stated by Mr. Syme (now Dr. Boswell), picture the plant to life, and the shorter description in Dr. Hooker's "Student's Flora" is admirable. Prof. Babington's description is wanting in vitality, and I did not readily catch the meaning of "1. more distant, bladders on both stem and leaves"—which I now find is a quotation from Lehmann's original description. The new E. B. plate will help to confuse, whilst the transferred old one of *U. vulgaris* I call good. To my notion the figure in "Flora Danica," 12, 1981, is better than that in Reichenbach's "Icones," unless, indeed, it should ultimately prove that two sub-species exist on the Continent to which the name *U. neglecta* is applied, and for this being the case there is some evidence in the herbarium (now incorporated at Kew) of M. Gay, who went so far as to separate a distinct-looking plant under the MS. name *U. galloprovincialis*, with the remark that it was perhaps new, or at least new to Europe. To those who have the opportunity it will be advantageous to compare the "Fl. Danica" representation with that of *U. vulgaris* in the same work (1, 138).

The prominent marks of distinction in well-grown plants at a corresponding stage of development and approaching maturity are:—

U. neglecta. Pedicels slender, four to six times as long as the calyx, straight and ascending after flowering; bracts lanceolate, upper corolla-lip projecting considerably beyond the small palate, which occupies only about one-fifth of the superficies of the lower lip, the remaining portion or flange of which spreads horizontally; bladders about one-tenth of an inch in length.

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* "The plants which I first received as *Utricularia vulgaris* from the New Forest in Hampshire and from Cornwall, and which I have chiefly worked on, have been determined by Dr. Hooker to be a very rare British species, the *Utricularia neglecta* of Lehm." The New Forest specimens were sent by Rev. H. M. Wilkinson, of Bistern; the Cornish, from near Penzance, by Mr. Ralfs (p. 395).

U. vulgaris. Pedicels thick, two to three times as long as the calyx, recurved and reflexed after flowering; bracts ovate, palate large and prominent, projecting out about as far as the length of the upper corolla-lip and occupying a full third of the superficies of the lower lip, whilst the free portion does not spread, but is reflexed all round; bladders twice the size (about one-fifth inch) of the above.

In general terms *U. vulgaris* is a thicker and coarser plant than *U. neglecta*, and, in the fresh specimens I have seen, had approximately orange-yellow versus lemon-yellow flowers. Whilst to the former plant we might apply such words as clumsy and peculiar-looking, we should, in contrast, say of the latter graceful and handsome. If we search for other marks of difference than those already mentioned, they offer in plenty—*e.g.*, the angle at which the leaf-pinnæ are arranged upon their common stalks, the different appearances of the hybernacula, &c.—and if we work at microscopic distinctions, such may be detected in the number of the bristles that are inoculated in the notches along the edge of the leaf-segments (three or four in a bunch in *vulgaris* against a single one in *neglecta*—Darwin); also in the number of the multicellular bristles that proceed from the margin of the bladder above the valvular aperture, and in the number borne by the two long prolongations which Mr. Darwin, carrying on his similitude of the bladder to an entomostracan crustacean, calls, for the sake of convenience, the *antennæ*. Whether there is any constant interval between the periods of flowering of the two species I am not prepared to say; my Kent plant was in good and progressing flowering state on 13th Sept., and *U. vulgaris* I have seen in like condition in Cheshire on 8th July. Perhaps there is a second crop of flowers.

Although I have little doubt that *U. neglecta* has sometimes been called *U. intermedia*,* there is, as far as we are concerned, an unbridgeable gulf between the two. If *U. intermedia* is kept to what Hayne had in view in founding the species, it is as distinct a plant as well can be, and holds an established position through North Europe, North America, and North Asia. I suppose it is the invitingly convenient name that has fathered to it such a miscellaneous assemblage of ill-conditioned, unnameable odds and ends of *Utricularia* as we sometimes see so called, and which would appear to have created with some a suspicion as to the integrity of the species. It, in contradistinction to *U. neglecta*, has evidently an attachment to the same kind of locality and surroundings as *U. minor*. Notwithstanding its wide distribution with us, the plant in flower is one of the rarest in the British catalogue. The only fine specimens that I have seen in this state are some collected by Mr. Borrer in August, 1840, from "boggy pools and streams on Scotland Heath, Corfe Castle," a station mentioned by Mr. Mansel-Pleydell in his "Flora of Dorset." They are exactly like Hayne's figure.

Where *U. intermedia* has been recorded from an unlikely habitat it would be prudent to examine if *U. neglecta* was not the plant meant. An ordinary botanist, acquainted with *U. vulgaris*, and working merely by the old text-books, if he met with *U. neglecta* would be puzzled how to name his find, and might venture on the name *U. intermedia*. I suggest this as an explanation for several of the records for that plant which I have from time to time noticed from improbable quarters, and of which there is so far no satisfactory confirmation. One instance comes to my memory as I write. In the supplement to Dr. Dickinson's "Flora of Liverpool," Mr. Shillito records *U. intermedia* from Thornton Marsh, Cheshire, a very unlikely place for that species, but likely enough for *U. neglecta*.

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* In the Borrer collection at Kew is a specimen which probably comes under *neglecta*, received from Rev. J. Dalton, with the ticket inscribed, "*U. intermedia.* Is it right? All I have. Sent by old Parson Holme from Cambridgeshire." Mr. Borrer adds his reply to the query, "I think not."

The plant that I now have to mention is the presumed novelty I spoke of as the inciting cause of my troubling the "Journal" with the foregoing notes. It is the *U. Bremii* of Heer. The name will be familiar to those of our botanists who may, whilst confining themselves to British plants, have been accustomed to use Prof. Babington's "Manual," from the fact that he has prognosticated its nativity with us in the various editions from ii. to vi., and has accompanied the assertion with a brief diagnosis. The specimens upon which I venture to think this prediction is realised are some that were sent (I believe by Dr. Gordon) to the late Sir W. J. Hooker, and are preserved in the Herbarium at Kew. The ticket is as follows:—"*Utricularia* ——; Moss of Inshoch, Nairnshire. Mr. Jas. B. Brechan, 16 Aug., 33." They are fastened on to the same sheet with Continental *U. intermedia*, but of course have no connection with that plant. What struck me on seeing these specimens was that they differed from *minor* in being more robust; my experience of that species being that luxuriance is shown by running to length, the individual retaining throughout its delicate fairy-like appearance; that the lower lip, though somewhat spoiled in drying, had not the *minor* shape; and that there was a difference in spur development from *minor*. I accordingly carefully compared the specimens with some German examples of *U. Bremii*, from Reichenbach fil. and A. Braun, and they seemed to me to agree in all respects. Mr. Baker also kindly looked at the series, and to his eye likewise the whole appeared identical. This is just how the matter rests at present, and I bring it forward simply that it may induce some botanist favourably situated to search in the district whence the specimens were derived, and that others with an additional prospect of it rewarding their search may bear the plant in mind.

It will, perhaps, come to the recollection of some that there has in the past been confusion about the Nairnshire district *Utricularia*. Though I cannot turn to the passage, I remember that Mr. Watson has specially referred to this difference of opinion in his writings. Dr. Gordon, in his "Collections for a Flora of Moray" (1839), gives the Inshoch station to *U. minor*, and of a plant from Loch Spynie, which is entered under the name *U. intermedia*, he says, "If there be a specific difference between this and *U. minor*, the Spynie plant upon closer inspection will probably be found to belong to the latter species." I hold that this discord adds strength to my claim for *U. Bremii*—that *it* may have been the stumbling-block.

The original and full description of *U. Bremii* will be found in

Hegetschweiler and Heer's "Flora der Schweitz" (1840), pp. 984-5. It would be out of place for me, with my trifling experience, to offer any opinion on the merits of the plant as a species; but, from what I can see thus far, I do not think it would pass to a higher grade than sub-species of Dr. Boswell's category. It certainly is not far removed from *U. minor*, and in the direction of *U. intermedia* the chain is continued through *U. ochroleuca* of R. Hartmann.*

A further memorandum I have made tells me that there is also in the Kew Herbarium a flowerless Bladderwort from Dr. Broomfield, which is a much stouter or coarser plant than the ordinary run of *U. minor*. It is sent under that name, and is from the only locality given in his "Fl. Vect." There is what may be the same plant, also flowerless, from Tichfield Common, Hampshire, in the Brit. Mus. collection, whilst there are exceptionally delicate flowering-spikes of undoubted *U. minor*, derived from the same locality from another source. These stronger plants should be looked to by those who have the opportunity. A further point to be cleared up is, what is the doubtful plant from Gloucestershire Mr. Watson speaks of in "Topog. Bot.," sent to him through the Exchange Club as *U. intermedia*, and by him placed in preference under *U. minor*.

March 22, 1876.

Supplementary Note.—I have to-day (April 11) had occasion to consult the British Herbarium of the Linnean Society, and therein I find good specimens of the Loch of Spynie *Utricularia*, derived from Mr. Winch's collection. The plant is named *U. intermedia*. It is certainly not that species, and it is equally certain that it is not *U. minor*. I am quite content to call it *U. Bremii*.

RECENT ADDITIONS TO THE BRITISH MARINE FLORA.

By Mrs. Merrifield.

In the year 1861 I received from Falmouth a specimen of *Polysiphonia* without specific name, a note of interrogation being attached to it. I was subsequently able to identify the plant with *P. divergens*, J. Ag., a native of the Adriatic and of the Atlantic at Cadiz. The plant is found entangled with other Algæ. It may be recognised by the 3 or 4 siphons visible in every part of the frond, and by the short articulations. A transverse section shows 7 siphons surrounding a central tube. If put into fresh water after being dried, it is apt to fly apart at the joints. My plant bears tetraspores.

Among some Mediterranean plants sent to me to name—if I could —I recognised *Ceramium circinatum*, Kütz., of which Agardh says the habitat is "Angliæ! Galliæ! et Hispaniæ!" &c. Yet the plant does not appear to have been noticed by British algologists! This induced me to look over my own specimens of *Ceramium*, and among them I was fortunate enough to find a few small specimens of *C. cir-*

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* Of *U. Grafiana*, Koch, I have not seen any specimens; it is from the description apparently very close to *U. intermedia*.

cinatum. Agardh remarks of this plant that it has the habit of *C. diaphanum* with the structure of *C. rubrum*. As Jersey plants were included by Dr. Harvey in the British Flora, I may mention that I have since received a larger plant of this species, bearing favellæ (undescribed by Prof. Agardh), from that island.

Shortly after this Miss Gifford sent me for examination a small specimen of another species with spines, which did not correspond with any British species. It was from Porlock, not far from Minehead, Somerset. This I identified as *Acanthoceras transcurrens*, Kütz. Sp. p. 684, a native of Calvados. Miss Gifford afterwards submitted this plant to Dr. Dickie, who, I am pleased to say, confirmed my opinion. Three specimens only have hitherto been found, and all by Miss Gifford. One of these was growing on Bossington Beach, quite at the eastern end of Porlock Bay. In this plant the cells of the lower zones are transcurrent. The spines are secund on the outer side of the ultimate ramuli, acute, rigid, hyaline, and formed of a single joint. The tetraspores are erumpent, and are seriated on the outer side of the uppermost segments. Colour blackish-purple.

I may add that I have found at Brighton a small plant of *Seirospora*, bearing cruciate tetraspores, as described by Areschoug. Another plant of the same species, also bearing tetraspores, had been previously found on the Jersey coast.

I shall be glad if the perusal of these notes prove any inducement to algologists to search more keenly among our native Algæ for Southern species which may have located themselves on these coasts.

SHORT NOTES.

THELOCARPON LAURERI, *Flot.*—The occurrence of this Lichen in Britain is so rare, that its appearance in great quantity is worth recording. Three habitats are given for it in Leighton's "Lichen-Flora," all in Shropshire, and I have now to add a fourth, also in the same county. In the autumn of 1874 a plantation on the Arcoll Hill, an outlier of the Wrekin, by some accident was set on fire, and a large portion was destroyed. The undergrowth, consisting of Heather, Bilberry, Brakefern, &c., was so dry that no efforts were able to arrest the flames till the whole area enclosed by the cart-ways for drawing timber was left bare and black; these formed an effectual barrier and arrested the conflagration. The damage extended over several hundred acres. Last autumn a new growth of vegetation began to make its appearance on the charred surface, amongst which were conspicuous *Marchantia polymorpha*, *Funaria hygrometrica* (la Charbonnière), seedlings of *Pteris aquilina*, and a quantity of Fungi, such as *Agaricus carbonarius*, Fr., *Peziza trachycarpa*, Curr., *Rhizina undulata*, Fr. On visiting the place this spring I found on the peaty portions a large quantity of *Thelocarpon Laureri*, in small patches from an inch to a foot across, extending over a very large area. At first sight I mistook it for the early growth of a Lichen-thallus, but when once recognised the eye became accustomed to its peculiar citron-colour and scattered mode of growth.—WILLIAM PHILLIPS.

THE POTATO-FUNGUS.—Last autumn (1875) Mr. C. Edmund Broome, of Batheaston, selected a number of Potato-leaves badly diseased with *Peronospora infestans*, Mont., and repeated my experiments. The leaves selected by Mr. Broome were only those infected with *Peronospora;* these Mr. Broome partly crushed and placed in a saucer of water under a bell-glass. The water was kept in a sloping position, so that only part of the magma was in the water; and the following is the result up to the present time:—The mycelial threads (from my observations *doubtlessly of the Peronospora*) ramified in every direction and produced, upon distinctly septate threads having no anatomical connection with each other, oogonia and antheridia precisely as described by me, and agreeing with *Artotrogus.* From last autumn till now (21st April, 1876) the oospores have gone on maturing, and are now generally rough in outline, rich brown in colour, and *still hybernating;* agreeing in every particular with the present condition of the bodies which I have myself preserved. The true *Peronospora* conidiophores have not been so sensitive of decay as to perish in the water, for they still abound in the magma together with the normal *Peronospora* conidia. So carefully has the experiment been carried out by Mr. Broome, that there is scarcely any trace whatever of foreign Fungi; the whole magma is one mass of decayed leaf-cells, *Peronospora* conidiophores and conidia, and resting-spores. At an early date De Bary's notes and criticisms will be properly answered, and complete mounted materials distributed amongst botanists.—WORTHINGTON G. SMITH.

Extracts and Abstracts.

RESEARCHES INTO THE NATURE OF THE POTATO-FUNGUS, *PHYTOPHTHORA INFESTANS.*

BY PROFESSOR A. DE BARY, of the University of Strasbourg.

(*Continued from* p. 126.)

HERE I may mention that this year I found the Potato-fungus on an exotic species of *Scrophulariaceæ*, viz., *Schizanthus Grahami*, on which, so far as I know, it had not been observed before. It appeared on this ornamental plant in a garden outside Strasbourg, belonging to Dr. Stahl, in the end of July, when the Potato-fields had been extensively attacked by it. The phenomena of destruction were the same as in the Potato-plant in stalks, leaves, and buds; the development of the Fungus was of extraordinary luxuriance, but here, also, no oogonia were found. This example, at any rate, reveals to us a new host for the *Phytophthora*, and demonstrates the possibility of other species being found in which it may grow not only luxuriantly, but also form oospores. The fact that *Schizanthus Grahami* is a Chilian plant, and, therefore, indigenous to the same region as *Solanum tuberosum* and its allies, may not, perhaps, be of any great importance in this connection, still it should be noticed.

It is, perhaps, not very unlikely that the oospores of *Phytophthora* may, in a climate different from that of Central Europe, be found in hosts which do not produce them with us. On that supposition the first place to turn to would be the native land of the Potato-plant. But no further observations need be made here on this subject, since it unfortunately belongs only to the region of speculation.

III.

10. To the question raised at the beginning of section 3 (page 113), concerning the hibernation of the Potato-fungus, and the manner in which it returns to the fields in summer, the researches described in the foregoing pages supply no answer, or, at least, not one in any way satisfactory. Even if the often-mentioned warty bodies were hibernating oospores of *Phytophthora*, like the similar oospores of *Peronospora Arenariæ* which resemble them, we should not gain much information bearing upon these questions, since their occurrence is, at the best, extraordinarily rare, while the Potato-fungus appears plentifully every year.

In all stages of the development and of the vital phenomena of the Potato-fungus, as far as they are known, the parasite acts, apart from the obvious specific peculiarities, precisely as many other plants which disappear in the autumn and return again in the summer, though we know that they do not entirely disappear in winter, but last through it in some form or other—mostly unapparent. These phenomena being everywhere confirmed, we ought not to assume that the Potato-fungus is perpetuated in a different manner. If we cannot find hibernating oospores belonging to it (like what are known in most of its allies), another form of hibernation must be looked for and found.

In a former publication* I was, perhaps, the first to call attention distinctly to the fact that the mycelium of *Phytophthora*, like that of parasites living in many other perennial plants, can be perennial in the surviving parts of the host. *i.e.*, in the case of the Potato, in its tubers. This has been repeatedly mentioned already, and is so easily tested by simple and well-known experiments, that a short statement of it will be enough here.

In large stores of Potatoes we very often find some that are diseased, *i.e.*, containing the living mycelium of *Phytophthora*. It cannot be disputed that the living Fungus may occasionally get into the field through planting such diseased tubers. I do not say that this happens largely; but, even if it never happened, the Fungus might still, quite unobserved, get into the fields by means of diseased tubers, because, as has been already said, the mycelium in the tuber forms conidiophores directly it is placed in a moist atmosphere, and such a condition is present in the usual temperature of spring. This may be easily seen in fresh sections, or on the injured surfaces of a diseased tuber. In moist storerooms the conidiophores may burst their way through the unbroken skin, and particularly through the eyes. Should this occur, even in one Potato, in one storeroom or cellar, it is clear that the conidia will find their way to other Potatoes, and attach themselves to them. If these *quite healthy* tubers should then be planted in the ground, the conidia will germinate, the germs penetrate some of the tubers, and the mycelium develope itself in them. All this is obvious from simple experiments which have been well known for a long time.

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* "Récherches sur le Développement de quelques Champignons parasites." "Annales de Sciences Naturelles," vol. xx., 1863, p. 1.

We have thus two ways in which the living Fungus that has survived the winter, may in the spring find its way to the fields with the seed. The second is, perhaps, the more usual way; at all events, it is the more dangerous, because, even with great care in the choice of seed, it cannot be avoided with certainty.

In both cases the Fungus is placed in the earth along with the tuber, and cannot there leave it; the Fungus must die and become corrupt in and with the tuber. It can, however, find its way to the foliage and attack it. The proof of this gives the answer to the question raised by me at the outset.

The facts which have been observed established that there are two methods by which the conidia may pass from the tuber to the foliage.

First, it is known that the mycelium of the Fungus in the tuber, even when in the ground, is able to produce conidiophores bearing conidia directly from the tuber. We can easily see how the conidia thus produced could reach the foliage—they might be carried up either by the growing plant which may have touched them, or by small animals which frequent both situations. Neither of these methods can be easily detected. Moreover, the formation of conidia in the soil cannot be very frequent. There should, therefore, perhaps be little weight attached to this method.

The *second* method can be easily observed and with great exactness. It consists in the mycelium growing from the tubers in and with the young plants, and producing conidia on them in the usual way; and these, of course, extend the Fungus to the healthy plants beside them.

In 1861* I called attention to the fact that tubers containing *Phytophthora*, when they are growing, not unfrequently send out shoots into which the Fungus passes from the tuber. The Fungus, advancing slowly in its growth, at last kills the shoots, which, for the most part, were always in a sickly condition. The same tubers. as is known, may also send out healthy shoots. At the same time I further showed that under special circumstances the Fungus in these diseased shoots developes conidia, which become centres for the further spread of the disease. These were not conjectures, but facts observed in experiments. The observations, however, were not made in the open field, but in the house and laboratory, and had not been confirmed by myself or observed by others in the open field. It was, therefore, a question whether these results were only to be obtained artificially or really occurred in the field, and this could only be decided by experiment. Accordingly, in 1874, in prosecuting the investigations undertaken at the request of the Council of the Royal Agricultural Society, I made an experiment in the garden. A Potato, with a tolerably well-developed shoot, containing *Phytophthora*, was planted in the garden with several others which had vigorous and healthy foliage. The diseased shoot was discoloured for some distance along the stalk, but continued to grow for a while; the brown places died off by degrees, were completely dried up, and no infection spread to its healthy neighbours all through the summer, though several healthy stalks had come into direct contact with the diseased one. Repeated examination with the microscope showed that the sickly shoot actually contained *Phytophthora;* kept moist under a bell-glass it formed conidia, but while in the open air no conidiophores were observed. The weather during the experiment was not unusually dry.

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* "Die gegenwärtige kartoffelkrankheit."

The negative result thus obtained caused me to doubt whether my previous explanation could hold good in the open field, and this opinion I stated in a letter to Mr. Jenkins, the Secretary of the Society.

Still, it would not have been justifiable to come to a final judgment from a single failure in an experiment dealing with such complicated materials as two kinds of living plants, and the phenomena connected with their relation to each other and the influence of the weather upon them. I accordingly repeated the experiment during the present year (1875). In March about fifty healthy Potatoes were inoculated at the eyes by fresh conidia. No exact test was applied to ascertain whether the infection had taken place; the result, however, showed that it had succeeded in most cases, though not in all. On the 2nd of April the tubers were planted in common garden-soil, in a box without a bottom, and open to the air—that is to say, in a miniature garden, which, in order to be more easily looked after, was thus fenced in. The tubers sent out shoots in a normal manner; many, even of the specimens known to be diseased, producing undoubtedly healthy foliage. One, a red kidney, was specially distinguished from the rest, as the six shoots which it sent above ground remained in a wretched condition. On May 12th these shoots had become brown; I cut off one of them for microscopic examination and found the living Fungus in it; the presence of the Fungus in the tuber was also afterwards confirmed. The other five shoots were left, and up to the 17th remained unchanged, without any appearance of conidia. On the following night a warm heavy rain fell, and on the morning of the 18th the stalks and petioles of the five shoots were thickly covered by conidiophores with mature conidia. On the healthy foliage of the other plants there was no trace of the Fungus as late as the 20th; but on the morning of the 21st two leaflets on the upper part of a branch, which was near the five sickly shoots, presented the characteristic spots of the *Phytophthora,* and on the lower surface of the leaves where these spots occurred, conidia were produced; no further indications of the disease were visible to the naked eye. From May 25th onwards, the Fungus spots were to be seen plentifully scattered without order on the stalks, petioles, and leaves of all the plants. About the same time several other diseased tubers also gave off small shoots, into which the mycelium of the Fungus had passed from the tuber; no further observation, however, was made on them, because the disease was then far advanced everywhere. Most of the shoots were still quite healthy at their base. They could not, therefore, have received the infection from their tubers, but it could only have come from the conidia produced on the five diseased shoots. To remove all doubts on this point, several stocks were entirely dug up and closely examined in all parts. Two red kidneys had the old tuber still turgescent, and altogether free from the Fungus; the base of the shoots was likewise entirely free from the Fungus, while in the upper part the Fungus spots existed in abundance. During all this time to the end of May, there was nothing remarkable in the weather; it was, in general, moderately moist. The wet weather, under the influence of which the fields here suffered so much from *Phytophthora*, did not come till much later; and at the time when my experiment was completed, I did not, in a number of excursions specially made for the purpose, discover any *Phytophthora* in the fields. The garden in which the experiment was made was in the town, far from the fields; it is to be hoped my experiment was not the means of extending the infection to the fields.

The results I have described having been accurately ascertained, the problem before us is as far as possible solved; that is to say, I have shown that the oospores are not found in this district, and that the perennial mycelium discharges the function of hibernation which is proper to the oospores in other species.

I may in a few words draw attention to this fact, that the generally-known phenomena connected with the occurrence of the Fungus correspond completely with the result at which I have arrived. This may not at first sight appear to be the case, for while the first infection of the plants in the fields takes place, as we see, in spring, the occurrence of *Phytophthora* is seldom plainly visible before July. But then even in large fields there can hardly be more than a few original seats of infection, since comparatively few diseased Potatoes will be planted, while numbers of the diseased tubers actually planted are rendered harmless from the Fungus not forming conidia either in them or in their shoots. There must be a very large quantity of conidia to enable the Fungus to spread over extensive areas. A comparatively small quantity can only be produced at first in the primary seat of infection. The original development of the Fungus, and the production of secondary centres of infection, must therefore proceed slowly and unnoticed. That is to say, the Fungus needs time to acquire the quantity of reproductive conidia necessary to affect large areas. Were it not so, the Potato-plant in damp places or in damp years would be attacked in spring and perish. It may not be superfluous to say that the case could scarcely be different if the Fungus hibernated by means of oospores which germinate in spring. Of course, if they were of rare occurrence, then the actual state of things at present would be brought about; but if they occurred very frequently, then an immediate and general attack of the disease in the spring would be unavoidable.

I have only to add to what I have said, that the vegetation of *Phytophthora* is known to be largely hastened and assisted by damp, and, on the other hand, to be retarded by drought. As a rule, however, the period of its first appearance is followed by the dry season of the summer. The period of its spreading extensively usually coincides with the beginning of the wet autumn, or, as was to be seen here in 1875, with wet seasons in the height of summer. In particular localities it may even occur on the plant before the arrival of these seasons, as in the valleys among our mountains, where there are regular heavy dews and comparatively numerous showers. In conclusion, attention should also be directed to the possibility of there being a connection between the phenomena in question, and the fact that the Potato-plant in its various stages of development supplies a varying nidus for the Fungus. From large experience, I consider it probable that *Phytophthora* grows more easily on a plant at the height of its development than on young stalks and leaves. It would be interesting, but not easy, to establish this clearly by experiment. It is a question, however, which would lead me beyond the limits of my present task were I to follow it out to its issue.

Strasbourg, December, 1875.

[We are indebted to the Council of the Royal Agricultural Society for permission to reprint this article from their "Journal," and for the use of the accompanying woodcuts.]

Proceedings of Societies.

Linnean Society, *March* 2.—Prof. G. J. Allman, F.R.S., President, in the chair. The Chairman, before commencing his duties for the evening, intimated the sad loss the Society had met with in the deaths of two of its oldest members—viz., John J. Bennett, F.R.S., and Adolphe T. Brongniart. A brief eulogium was passed on each, and their labours in the cause of Botany summarised. We refer our readers to the obituary notices in this Journal (pp. 94 and 97) for details. The botanical papers read were:—"On a new genus of *Turneraceæ* from Rodriguez," by I. B. Balfour. *Bois Gaudine* is the name by which this tree is known to the inhabitants of Rodriguez. Handsome though small, never attaining any great height, it grows chiefly on the hilly parts of the island. Its wood is fine-grained and light-coloured, and might be made serviceable for the purposes of the carpenter, though it is seldom used. It has an erect habit, and the terminal branchlets are clothed with light green foliage. The author thinks it worthy of generic separation, and terms it *Mathurina*. In dealing with its affinities he regards it as closely connected with the monotypic Panama genus *Erblichia*.—Mr. J. G. Baker made some general observations on the flora of Rodriguez. Mr. Balfour's collections comprised 280 species, of which 110 were general weeds of the tropics, leaving 170 indigenous Phanerogams and Ferns. Of these thirty-five appear to be new species and two new genera, the one above described and another a Rubiaceous plant. The general flora has a strong affinity to that of the neighbouring island Mauritius, and the new species are members of Mauritian or of cosmopolitan genera, such as *Quivisia*, *Eugenia*, *Lobelia*, *Clerodendron*, *Hypoestes*, *Coffea*, *Pilea*, *Peperomia*, *Aloe*. There are three new Palms and two new *Pandaneæ*. A new *Abrotanella* shows affinity with the more temperate floras of Australia and Chili, and *Nesogenes* is a Polynesian genus.—The Rev. J. M. Crombie alluded to the Lichens of the island. There are sixty or seventy species, including several endemic cortical ones. A comparison with Mauritius is impossible, as very few Lichens are known from that island. The Rodriguez ones have considerable affinity with those of Ceylon.—"On Pollen," by M. P. Edgeworth. The author treated of the shape and relative size of the pollen-grains in many orders of plants. About 400 different species have been carefully investigated by him—each measured to scale and sketched accordingly. Some families of plants he finds present great uniformity of figure and size in their pollen, but on the contrary others are as notable for diversity, even in what would seem closely related species.—"Notes on Algæ found at Kerguelen Island by the Rev. A. E. Eaton," by Prof. Dickie. Three new species are therein described, viz.:—*Sphacelaria corymbosa*, *Melobesia Kerguelena*, and *Ptilota Eatoni*.* Of a total number of sixty-five Algæ recorded, sixteen belong to the olive, thirty-four to the red, and fifteen to the green series. Nine species seem to be peculiar to the island, and twenty-one, or about one-third of the whole, are found elsewhere and on European shores.—"A List of the Musci and Hepaticæ collected in Kerguelen Island by the Rev. A. E. Eaton," by William Mitten. This contains the names of thirty-eight Mosses and thirteen Liverworts. Among the former *Bartramia Eatoni*, and among the latter *Tylimanthus viridis* and *Balantropsis incrassata*, are species new to science.—Mr. Carruthers exhibited under the microscope the preparations of the Potato-fungus made by Prof. De Bary, and gave an abstract of the results arrived at by the latter in his recent investigation of the subject. As we have reprinted the memoir of De Bary in full it is unnecessary to recapitulate the subject here. Mr. W. G. Smith made some observations in support of his interpretation of the Fungus seen by him, which had been controverted by De Bary, and the further discussion of the matter was postponed.

March 16*th*.—J. G. Allman, Esq., F.R.S., President, in the chair. Mr. Van Voorst presented to the Society two volumes of British Algæ authentically named by Prof. Harvey.—Mr. A. W. Bennett made some observations on the growth of the stalk of the Hyacinth. He found that the greatest energy of growth is always in the lower portion of the stalk, thus agreeing with most recorded observations on growth, but offering a contrast to the flower-stalk of *Vallisneria*. The following papers were read:—"On the hygroscopic mechanism by which certain seeds are enabled to bury themselves in the ground," by Francis Darwin. The seeds observed were those of several Grasses and of *Anemone montana*, but *Stipa pennata* was specially examined. This has a strong awn, the lower part vertical and twisted with two knees, and a long horizontal upper feathered portion. Moisture causes the spiral portion to untwist and the horizontal part to revolve, the knees disappearing and the whole awn becoming straight; drought reverses the process. In nature the flat feathered portion is readily entangled in vegetation, and the seed rests vertically with its point on the soil. When the spiral untwists with moisture, the horizontal part being prevented from revolving, that motion is transferred to the seed, and to this being added pressure on its point it becomes screwed into the ground. With dryness and the reversal of the screw the seed is not drawn out again, but curiously is thrust deeper down by additional mechanism. Heat acts in the same way as moisture. The cause of torsion as explained by Hildebrandt and Hanstein the author thinks insufficient, and shows that the power resides in the individual cells of the awn, which when isolated behave precisely as the whole awn with regard to moisture, heat, and dryness.—"On the Lichens of Antarctic America collected by Dr. R. O. Cunningham during the Voyage of H.M.S. *Nassau*, 1867-9," by the Rev. J. M. Crombie. The author describes ninety-seven species, of which twenty-four are new. A new genus *Endocena* is included.—The discussion on the Potato-fungus was continued by Mr. Carruthers restating the points in which De Bary differed from Mr. W. G. Smith.—The Rev. M. J. Berkeley objected to the style of De Bary's criticisms, and considered that Smith had fully proved the sexual congress of the bodies on the different-sized and separate mycelia and considered by him antheridia and oogonia.—Mr. W. G. Smith read a long defence of his position, and said that Sadebeck's recent observations on *Pythium Equiseti* supported his own as to the two sorts of mycelial threads; he also considered that De Bary had misapprehended Montagne's *Artotrogus*. —Mr. Renny thought the subject still unsettled, but considered that De Bary had made out his case so far as he had gone, and that Smith's drawings were less representations of actual microscopic specimens than diagrams expressing the net result of a number of observations; he pointed out that till Mr. Smith had grown his resting-spores their nature must remain uncertain, and expressed his own opinion in favour of their being the same *Pythium* as he had himself noticed. —Mr. Thiselton Dyer suggested clearing the field of discussion by eliminating the obscure *Artotrogus* altogether, its structure with oospores intercalated in the threads being clearly different from the *Peronosporeæ*.—Mr. Carruthers, in reply, defended De Bary from the charges of hypercriticism.

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* The diagnoses of these have been given in this Journal, pp. 50, 51.

April 6th.—Prof. J. G. Allman, President, in the chair.—Mr. Holmes exhibited living specimens of some rare Mosses collected by himself in Kent. *Anacalypta cæspitosa* was found on a damp, bare spot on a chalky declivity near Otford; *Gymnostomum tortile* grew with it. *Seligeria pauciflora* has only been reported from Sussex, Yorkshire, and Surrey; it was found in a wood near Dunton Green, also near Wrotham, Dartford, and Folkestone. *Hypnum silesiacum* is from rotten stumps of *Castanea vesca* in Abbey Wood, where it was found by Mitten thirty-two years ago; *Dicranum montanum* and *D. flagellare* occur in the same locality.—Mr. Holmes also showed the root and foliage of the "Drias" of Morocco, which had been determined to be *Thapsia garganica*, var. *Silphium*, of De Candolle, a plant of interest from being considered by some botanists to have been the celebrated Silphium of ancient Cyrenaica. The papers read were all zoological.

April 20th.—G. Bentham, Esq., Vice-President, in the chair. The following communications were read:—"On a specimen of Zanzibar Copal containing a leaf," by Dr. Kirk. This specimen, which was exhibited, contained a perfect leaf with its two leaflets of the *Trachylobium* of Western Africa, and seemed to show conclusively that the resin was derived from the existing species.—"On the African species of the genus *Coffea*," by W. P. Hiern. The author describes fifteen species, eight of which are new. The Liberian or Monrovian Coffee, which has, from the flowers not having been seen, been considered a variety of *C. arabica*, is made a distinct species, and described under the name *C. liberica*. The ordinary Coffee, *C. arabica*, is stated to be a native of Abyssinia, Central Africa, and Angola; it possesses several varieties in the size, shape, and colour of the berries.—"On the species of *Narcissus*," by Shirley Hibberd. This paper professed to revise the genus on new principles, and proposed sweeping changes of nomenclature in defiance of botanical rules.—Mr. Thiselton Dyer exhibited specimens of Latakia Tobacco, which has hitherto been considered to be the produce of *Nicotiana rustica*. By soaking out the constituent parts it was found to consist of the upper part, inflorescence, and young capsules of a form of *N. Tabacum*. The peculiar flavour is given to this Tobacco by the smoke of the wood of *Pinus halepensis*, in which it is suspended for some months.—"Contributions to the botany of the *Challe ger;* Algæ, chiefly Polynesian," by Prof. Dickie.—"On the Freshwater Algæ collected in Kerguelen Island by the Rev. A. E. Eaton," by Dr. Reinsh.

Notices of Books.

Science Primers—Botany. By J. D. HOOKER, C.B., P.R.S., with (68) illustrations. London: Macmillan. 1876. (pp. 117, 12mo.)

THE object of this little book as given in the preface is to afford not only an elementary knowledge of the principal facts of plant-life, but also the means of training beginners in the methodical and accurate observation of plants. This latter purpose, of course, necessitates a supply of specimens, and Dr. Hooker recommends that the more common and easily cultivated plants (of which he gives a list) should be grown in school gardens and arranged there systematically, and also that the teacher should have a copious supply of dried flowers, &c., for dissection by the pupils, when fresh specimens cannot be procured.

Among the numerous elementary books on Botany, the present is likely to occupy a prominent place, as the eminence of its author will cause it to be recognised everywhere among school-teachers as—so far as it goes—an authoritative exposition of the subject.

There is nothing special in the arrangement of the matter. We have an introductory chapter on the nature of plants, and a short account of tissues and cell-growth, and the food of plants; the study of the Phanerogams is commenced by examining the growing seed, and the various organs are then taken in their usual order; there are chapters on fertilisation and on the characters of Gymnosperms; and the subject is concluded by an explanation of the principles of classification, and an account of a few simple physiological experiments. All notice of the Cryptogams is excluded. In the treatment of the material great skill in condensation is shown, and a great many subjects are touched upon which rarely appear in so completely elementary a text-book; indeed brevity could scarcely be carried further than here. In spite of this the author has generally secured clearness, and his literary ability has enabled him to render the condensed record smooth and even pleasant reading.

It is a pity to be obliged to add that signs of haste are evident, and it is specially to be regretted that a little more time and care were not bestowed upon the correction of the concluding pages. In a book coming with authority, and specially addressed to a class ignorant of the subject in hand, it was very important to avoid slips of all kinds. It is, therefore, not necessary to apologise for pointing out some which seem to deserve that description. In the list of plants (pp. 107-110) are several misprints, the names of the two first divisions of Dicotyledons are not given, the Buckthorn is placed in *Celastrineæ* and the Laurustinus in *Cornaceæ*, whilst the Order *Betulaceæ* appears among the petaloid Monocotyledons ! It is scarcely correct to speak (p. 83) of the fruits of Grasses and Compositæ as formed of one carpel, nor ought the pappus of the latter to be treated absolutely as a modification of the calyx. The stone of the Olive-drupe (p. 86) is not 2-celled, though the ovary is so. In the figures of pollen (p. 72) the reference-letters *a* and *b* appear to be transposed. It is implied (p. 21) that stomata are found only on the leaves, and at p. 38 we meet with the statement that the Elm and the Willow increase only by terminal buds. It must be admitted that these and some other similar more or less misleading passages detract to an appreciable extent from this as a trustworthy primer. H. T.

Botanical Names for English Readers. By RANDAL H. ALCOCK. London: L. Reeve. 1876. (pp. 236.)

IT will be best to describe the nature of this rather remarkable book in the words of its author, "I have attempted in the following pages to explain the scientific names of British plants in a popular manner, so as to be useful to those who have no knowledge of any foreign language. I have also attached, as far as I could, the oldest authority for each name, in order to give an idea of its history; and as this required some account of the authorities themselves, I have divided the work into two parts, the first of which is an account of most of the names of plants up to the time of Linneus, so arranged as to give at the same time a general sketch of the history of Botany in that period; the second part deals with the meanings of the names only." The scope and purpose of the volume are thus clearly defined, and what it actually contains accurately expressed.

To take the second part first, as it is the foundation of the book; we find the generally-received names of our British plants (as given in the standard Floras) arranged alphabetically in two lists, the first consisting of "substantive names," consisting of all the generic names, and also those specific ones which, from having been old names of genera, pharmaceutical appellations, or popularly used words, have retained their substantive form; whilst the second list is composed of the various adjective terms found as specific names of British plants. In each list the meaning of the name is given, and in the former the derivation is traced out, by reference to the earliest author using the word.

The author appears to have performed what he set himself to do with considerable ability; he has certainly kept constantly in view the class of person for whom he was writing, namely, those who say "Hydrocot'eel instead of Hydrocot'y-le, maritee'mum instead of marit'imum, ach'er instead of a'cre." All the names are accented, and the remarks on pronunciation are judicious. No Greek letters are employed, which renders it impossible to spell some of the Greek words; but to have introduced them would have been useless.

The sketch of the history of Botany in relation to nomenclature is well and concisely written. Most of it is familiar to those who have consulted Pulteney and more recent books on the subject. The chapter on Arab physicians, however, contains an interesting account of a very little-known group of naturalists, in great measure drawn from Würstenfeld's "History." There is an appendix containing additional information relating to some of the older English botanists, but nothing of novelty.

There is no doubt that the book will prove a useful one to those in whose behalf it has been compiled.

H. T.

Botanical News.

ARTICLES IN JOURNALS.—MARCH.

Grevillea.—M. J. Berkeley, "Notices of North American Fungi" (contd.).—M. C. Cooke, "New British Fungi" (contd., t. 64).—Id., "On *Pellicularia*, gen. nov., the 'black-rot' of Coffee."—Id., "On some Indian Fungi" (t. 63).—Id., "On *Peziza brunnea.*"—W. Phillips and C. B. Plowright, "New and rare British Fungi" (contd.).

Œsterr. Bot. Zeitschr.—W. Velten, "Active or passive?"—V. de Borbas, "*Verbascum Freynianum*, n. hybr. (*Chaixii* × *Thapsus*)."—L. v. Vukotinovic, "Two Croatian *Hieracia.*"—F. Hauck, "Algæ of Gulf of Trieste" (contd.).—F. Hazslinsky, "On *Sphæria morbiformis* and *S. spuria.*"—F. Antoine, "Botany of the Vienna Exhibition" (contd.).

Botanische Zeitung.—J. Reinke, "Researches on growth" (contd.).—P. van Tieghem, "New observations on the fructification and supposed sexuality of *Basidiomycetes* and *Ascomycetes.*"—A. Dodel-Post, "On swarmspores of *Ulothrix zonata.*"—T. Irmisch, "On the germinating plant of *Rhipsalis Cassytha* and its development" (tab. 4).

Flora.—H. de Vries, "On Wood-callus" (contd., tab. 1-3.).—J. Sachs, "On Reinke's 'Researches on growth.'"—A. Geheeb, "Bryological notes from the Rhone Mountains."—A. de Krempelhuber, "Lichenes Brasilienses" (contd.).

Hedwigia.—Sauter, "Hymenomycetes novi."

New Books.—W. P. Schimper, "Synopsis Muscorum europæorum." edit. 2. 2 vols. (Stuttgart, 1876. 28s. 8vo.)—M. Treub, "Le Méristem primitif de la racine dans les Monocotyledones," avec une préface par W. F. R. Saungar. (Leide. 1876. 4to. 10s. 8 plates.)

Dr. Farlow has reprinted from the "Bulletin of the Bussey Institution" some valuable botanical articles, consisting of the following. An account of the disease of Olive and Orange trees in California, which is accompanied by the growth of states of the Fungus *Fumago* *salicina*; on the American Grape-vine Mildew (*Peronospora viticola*), with a synopsis of the *Peronosporeæ* of the United States; a list of Fungi found near Boston; and a full account of that destructive disease, the Black Knot of Plum and Cherry trees.

The 81st part of Baron von Mueller's "Fragmenta Phytographiæ Australiæ" commences a 10th volume, and contains descriptions of many new species of various Orders.

Mr. Kurz, of Calcutta, continues his Contributions to the Burmese Flora in the Journ. As. Soc. Bengal for 1875 (pp. 128-190), and includes *Rutaceæ* to *Sapindaceæ*. These Orders having been already done in the new "Flora of India," there are numerous criticisms on that work.

The same Journal contains some notes on new Indian Oaks by Mr. Kurz, with a plate; a description of *Tupistra Stoliczkana*, n.sp., from Moulmein; and descriptions of other new Indian plants from various parts, including *Daphniphyllopsis* and *Natsiatopsis*, new genera of *Olacineæ*, both of which are figured.

M. Lagerstedt enumerates in the Bihang of the Swedish "Vet. Akad. Handlingar" for 1876 the salt-water *Diatomaceæ* of Bohuslän, with copious references and synonymy.

We are indebted to Mr. Axel Blytt, of Christiania, for a copy of his interesting essay on the immigration of the Norwegian Flora just published. The paper is written in English, and well worth study by British botanists in connection with the distribution of our own Flora. A map showing the range of the groups of vegetation is appended.

The Rev. M. J. Berkeley has presented to the Department of Botany in the British Museum James Sowerby's original drawings for the "English Fungi," published in 1797-1809, consisting in all of 530. The Museum already possessed the clay models made by Sowerby during the progress of the work, as well as the original drawings for the plates of "English Botany," in which it will be remembered the Fungi were not included. Mr. Berkeley's gift, therefore, very usefully completes the series of original illustrations of British plants in the Museum.

Mr. J. F. Duthie, late of Cirencester, has been appointed Director of the Botanic Gardens at Saharunpore, formerly held by Falconer, and lately by Mr. McIvor.

The post of Lecturer on Botany at S. Mary's Hospital, London, lately resigned by Dr. Trimen, has been filled by the appointment of Mr. W. B. Hemsley, Lindley Librarian to the Horticultural Society.

Giles Munby, formerly of York, died at the Holt, Farnham, Surrey, on April 12th, aged sixty-three. He lived for many years from 1839 in Algeria, and has published a very useful catalogue of Algerian plants, first issued in French in 1847, arranged on the Linnean system, and afterwards rearranged in the Natural Orders a printed in Latin in 1859, and a second edition in 1866; in last the number of species enumerated reaches 2964. *Munbya* genus of Borragineæ, was dedicated to him by M. Boissier.

Mr. R. A. Pryor would be obliged to any botanist who could g him information relating to specimens of the Rubi of Hertfordsh several sets of which were distributed by the late Rev. W. H. Colem and cannot now be traced. Address, Hatfield, Herts.

Original Articles.

ON *ANOMOCLADA*, A NEW GENUS OF HEPATICÆ, AND ON ITS ALLIED GENERA, *ODONTOSCHISMA* AND *ADELANTHUS*.

By Richard Spruce, Ph.D., F.R.G.S., &c.

(Tab. 176, 177.)

(*Continued from p.* 136.)

In Pteropsiella frondiformis, *nov. gen.*—a curious Hepatic gathered by myself on the Rio Negro, with broad linear fronds recalling small plants of the Fern *Pteropsis furcata*, yet with postical inflorescence, of both sexes, scarcely distinguishable from that of *Cephalozia*, from which the habit is, in other respects, totally diverse—the male flowers, although usually occupying the whole of a long slender postical spike, are also often found continuous with the apex of the main frond, or occupying the base or the apex of a frondose branch. In this case the transition from a linear frond, traversed by a medial costa, to distichous bifid leaves, is very instructive; for the change is very rapidly effected, and is much the same as if the leaves should be cut out of a sheet (the pagina of the frond) with scissors, and set on again to the costa or stem—not longitudinally, as when united into a continuous flat membrane, but obliquely—at first slightly so, but gradually more inclined, until they become nearly transverse. This gives them standing room, for they are only half as long as the breadth of the pagina, but twice as broad as the space they would have occupied if placed lengthwise of the stem; being made up of almost exactly the same number of cells as a corresponding portion of the undivided pagina. The leaves, or more properly bracts, thus "cut out" are ovato-quadrate, concave, emarginato-bifid, the apices being apiculate with a single long truncato-conical cell. The upper bracts (in a terminal spike) are the most modified and the most exactly transverse, and they each enclose a solitary antheridium, placed near the antical angle of their base; the lower bracts being usually empty.

The antheridia of Hepaticæ, whether solitary, as in a great many genera, or grouped by twos, threes, &c., as in others, always stand along each margin of the upper side of a stem or branch—or of the costa in a frondose species—*i.e.*, they are semi-antical; and there is no exception to this in the entire family. Where there already exists a leaf or lobe in that position (*i.e.*, incubous) it has only to be slightly modified to shield the antheridia; but where the leaves are purely succubous, a semi-antical lobe is generally added on for that purpose, or the leaf is simply dilated in front. In a very few genera the antheridia remain unprotected, no addition being made to the upper margin of the adjacent leaves, as in *Fossombronia*; in others they are buried in alveoles of the costa, and at first shielded by the upper cell-layer, projecting over each as a conical papilla, but finally ruptured when the contained antheridium is ready to burst and eject its contents, as in *Noteroclada*. Compare also the male branches, or amenta, of *Aneura*, where the antheridia are immersed in contiguous alveoles of the costa, and partially veiled by the incurved and toothed pagina—often almost cut into distinct leaves or bracts; and the similarly immersed, but usually more scattered antheridia of *Pallavicinia*, where the pagina is narrowed, but otherwise unchanged, and a semiantical scale-like bract is set on over each alveole.

In the prototypes of *Blepharostoma* and its allies the leaves have been developed (in part) on a different plan, but I cannot delay to adduce what evidence I possess on this head. Whether originally generated at certain intervals along an axis or stem, by the addition of cell to cell, by the usual process of cell-division, or differentiated out of a previously-formed wing or border of the stem, I cannot doubt that the lateral leaves have first come into existence in connection with the male organs. This seems proved by the fact that throughout the *Jungermannideæ*, however much the stem-leaves may have become metamorphosed, there is a constant tendency in the male bracts to revert to the original type of a nearly equally 2-lobed transversal leaf, whereof the antical lobe (to which the antheridia are axillary) is incubous and the postical succubous.*

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* It is remarkable that a truly antical leaf—*i.e.*, one placed at the very middle of the upper side of the stem, symmetrical in outline and in its transverse insertion—is exceedingly rare in Hepaticæ, though by no means uncommon in Mosses. We have, however, an instance of its occasional presence in *Bazzania*, where an antical leaf subtends each fork of the repeatedly dichotomous stems. There is a near approach to an antical leaf in *Lepidozia* and some other pinnately-branched genera, where the leaf subtending each pinna, and standing partly upon it, partly on the stem, is very nearly symmetrical, and is less divided than the other stem-leaves. In the perianth an antical leaf seems added on in a very few species of *Lejeunea* and *Frullania*. It is perhaps more often present in the calyptra; and from the capsule it is normally never absent, hence its 4 valves, which are but modified leaves, as is beautifully seen in *Herberta* (*Sendtnera*), where each valve is deeply and unequally bifid, exactly as in the stem-leaves.

I reserve for another occasion the consideration of the modifications undergone by the leaves, until from having been united into a simple flat lamina they have become in many genera very composite structures. It is singular that the leaves bear traces in some genera of having been separated into two or three distinct leaves in some previous phase of the existence of the plant, and have mostly (not always) become reconsolidated in part (*i.e.*, connate) by very obvious sutures, which sometimes leave overlapping edges (*e.g.*, in *Scapania*, *Schistochila*=*Gottschea*, *Micropterygium*, &c.); while in the allied but more robust and more highly specialised family of Mosses such reunions are almost unknown until we reach the peristome—that most beautiful and endlessly-varied of any organ in the whole vegetable kingdom, regard being had to the simple materials out of which it is framed. Instances of the leaves of Mosses becoming abnormally connate are not, however, entirely wanting. I have seen, for instance, the bracts of *Phascum muticum* united into an involucre which strongly recalled that of *Nardia Funkii*.

As an exercise in the comparative anatomy of the Cryptogamia, I recommend the student to compare *Selaginella* among Lycopods with *Scapania* and *Diplophyllum* among Hepatics, and with *Rhacopilum*, *Hookeria Patrisiæ*, and a few other Mosses which have tetrastichous leaves, those of the two upper series being smaller; also the tristichous-leaved *Hypopterygium* among Mosses, where the third row of leaves is undermost and much the smallest, to many stipuliferous

The postical leaves never bear antheridia in their axils. In the *Jungermannideæ* their origin is plainly posterior in time to that of the lateral leaves, and they have apparently been called into existence to relieve the stem of the task of bearing the radicles and providing them with mucus. The delegation of the rooting apparatus to special branches—the flagella, bearing three rows of radicles—is a still later "invention," confined usually to a few species, but sometimes common to all the species of a genus; and their fortunate possessors have a great advantage in the struggle for place and life. Those accustomed to observe the habits of Hepatics in nature will recall abundant proofs of this. Watch a *Bazzania* (*Mastigobryum*, Syn. Hep.), with its numerous flagella, nearly as stout as those of a *Selaginella*, invading a bed of *Lepidozia* or *Plagiochila*—literally walking over and into it, and finally overlaying and extinguishing it. Our own *Jungermannia riparia*, Tayl.—well distinguished by its flagella from *J. cordifolia*, Hook., as Taylor has long since pointed out—has become by their aid far more widely and generally distributed than its larger and more specious ally. The common *J. crenulata*, Sm., of our moors bears flagella, and is often associated with *Nardia scalaris*, Schrad., which much resembles it in size and in its round leaves, but is eflagelliferous; and it is instructive to observe how the former gradually encroaches on and at last ousts the latter. Note, likewise, the behaviour of *Odontoschisma Sphagni* to the eflagelliferous *Jung. ventricosa*, which often enters into unequal competition with it. Even the tender little *Cephalozia bicuspidata* is enabled by the possession of flagella to resist drought and other enemies far better than many more robust plants. But why multiply instances of what everyone may observe for himself? I will only add that the flagella of Hepaticæ, how-

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Jungermannideæ, especially to some of the acuminate-leaved *Lejeuneæ*. And I venture to suggest that no speculations on the origin and disposition of the leaves in higher orders of plants can be complete and accurate which are not based on a previous study of the same subject in the Hepaticæ.

To state fully my views on the sexual relations of the Hepaticæ would swell this memoir into a treatise. I will only mention here that my excellent friend Dr. Lindberg has lately advocated (Journ. of Linn. Soc., 1872, p. 189) the substitution of the term "colesule," first proposed by Necker in 1793, for "perianth," as commonly employed in this family, and that I can see no adequate reason for it. If I were asked to define "colesule," I could not do it better or more briefly than as the "perianth of Hepaticæ." It is argued that it cannot be analogous to the perianth of Phanerogams, because it is later developed than the sexual organs it encloses; but the same thing is not infrequent even in those plants, the floral envelopes being often very rudimentary at the time the stamens are fully formed and the ovaries ready for fertilisation. Lindley long ago pointed out that "the stamens and pistils have often obtained consistence enough to dispense with protection before the petals are enough developed to defend them" (Introd., ch. vii.). I have opened a flower-bud of *Ranunculus Ficaria* in the early spring, and found the outer anthers already discharging their pollen, but the petals still so rudimentary that they appeared only as a 9-crenate rim around the base of the stamens. Anyone who has gathered trees largely must know how often the "blossoms" are arrested in their development, and sometimes remain quite obsolete, although the stamens and pistils perform their office, and are followed by fruits; so that after watching the progress of the flower-buds for months he may be able to secure very few or no perfect flowers: a case analogous to that of our apetalous Violets and many other similar ones.

ever much they may resemble the flagella of Selaginellas, are not (like those) mere roots, but are more nearly analogues of the aërial roots of Phanerogams, for they always retain the potentiality of reverting to the condition of leafy branches, which may either (as innovations) continue the growth of the parent plant or start off on a separate existence.

The mode of branching in the Hepaticæ has been too little attended to, but affords important characters, depending chiefly on the insertion of the branches, not only on the stem, but with respect to the leaves, to which they are by no mean always axillary, as in Phanerogams. It is mostly constant to one type in the same genus, and sometimes throughout large groups of genera. We have already seen it distinguishing *Anomoclada* from all its co-ordinates. Among the latter, the fine genus *Micropterygium*, of which I have several new species, has very similar ♀ inflorescence and fruit, but postical (not antical) in origin, like the rooting flagella and the ♂ catkins; yet the leafy branches are lateral—exactly axillary to the conduplicate stem-leaves at the fold—whence the pinnate habit characteristic of the genus. In *Bazzania* the stem divides by repeated equal forkings in one plane, and is therefore dichotomous; but the inflorescence of both sexes is postical, as in *Micropterygium*, from which it is further distinguished by the structure of its leaves. In *Lepidozia* the branches (pinnæ) are axillary to the normally 4-cleft leaves, but the flowers and flagella to the folioles, i.e., they are postical, as in the preceding genera. This elegant genus divides naturally into three sub-genera, as follows:—

1. *Eulepidozia*. *Plants monoicous*, in depressed tufts, short, pinnately branched, *rooting by postical flagella*, more rarely also by attenuated lateral branches. *Leaves incubous*, cloven to the middle. *Perianth thickened*, *of* 2 *layers of cells*, the mouth *slightly toothed* or almost entire.—I know only one species, the common European *L. reptans*.*
2. *Ptilolepidozia*. *Plants dioicous*, densely stratified, tall, *plumæformi-pinnate;* lateral branches often attenuated and rooting; *postical flagella none*. *Leaves incubous*, cloven to about the middle. *Perianth of never less than* 2, *but most frequently of* 3 *or* 4 *layers of cells*, the mouth slightly toothed.—Abounds in mountainous regions of the tropics and southern hemisphere. In the Andes grows in

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* I have examined fertile plants of *L. reptans* from various parts of England, Ireland, and the Pyrenees, and all are monoicous, having slender male amenta on the same plant as the female flowers; but the young plants are often unisexual. The dioicous "*L. reptans*" spoken of by some authors is possibly distinct.

Our *Kantia Trichomanis* (*Calypogeia*, Tr. Syn. Hep.) is also certainly monoicous, and fruits freely in the Castle-Howard woods in the spring-time. The flowers stand normally 3 together, in the axil of a foliole, thus (♂ ♀ ♂); but one or other flower in each triplet is apt to be obsolete, thus obscuring the monoicous character. We have probably a second species, in bogs and wet places, with dioicous inflorescence, and large, very slightly notched (or even quite entire) folioles; but I have seen no fertile specimen.—*K. arguta*, N. et Mont., grows in our old quarries and sandy moors, where I gathered it as long ago as 1842, and where it has lately been refound by Mr. Stabler. (Conf. Lindb. Not. Soc. pro F. et F. Fenn., p. 363.)

wide beds at the foot of trees, or hangs in masses from the trunk and branches, and from rocks.—One species is Irish, *L. tumidula*, Tayl., scarcely more than a subspecies of *L. cupressina*, Sw.

3. *Microlepidozia.* *Plants dioicous*, in depressed matted patches, or creeping among Mosses, slender, almost capillary, with (or without) *postical flagella. Leaves transverse*—neither succubous nor incubous—*deeply cloven. Perianth thin, of only one layer of cells; ciliato-laciniate* at the mouth.—Corresponds nearly to the § *Capillares* of "Syn. Hep.," and includes one European species, the common *L. setacea*, Huds.

The two former of these sections differ but slightly; the third is almost distinct enough to form a genus apart.

In *Aneura* the frond is always branched, and often decompound, but all the branches are lateral; although when the growth of a frond is arrested—as by the decay or rupture of the leading shoot—it is sometimes renewed by a postical innovation. The female ramuli are as truly lateral as any other branches, as may be easily seen in those that have remained unfertilised, and are sometimes considerably elongated; but when fertile the receptacle becomes depressed and gibbous (as in *Acrobolbus*, *Nardia geoscyphus*, &c.), and may appear postical, if its origin be not carefully traced. Thus much on the ramification of the Jungermannideæ must suffice for the present.

Besides *Odontoschisma* there is another genus which nearly approaches *Anomoclada*, namely, *Adelanthus*, Mitt., but as its differences are more patent I have not thought it necessary to record them above. *Adelanthus* was founded by Mr. Mitten, in 1864, for the reception of *Jungermannia decipiens* of Hooker (discovered by Miss Hutchins near Bantry) and a few other species which, so long as they were known by only barren specimens, had been bandied about between *Jungermannia* and *Plagiochila*. To the latter genus there is considerable resemblance in habit and in the toothed leaves, which, however, differ essentially in the antical margin being incurved, whereas in *Plagiochila* it is invariably recurved. In June—August, 1857, I gathered *Jung. decipiens* in the Forest of Canelos and on Tunguragua—plants of both sexes, the females with perfect perianths; and (probably about the same time) fertile specimens were gathered by Wright in the island of Cuba. The inflorescence proving to be lateral at once sundered *J. decipiens* from *Plagiochila*, and, combining that species with two or three others which had been gathered in perfect state, chiefly by Dr. Hooker on the Antarctic voyage, Mr. Mitten proposed the name *Adelanthus* for the group; and, although the character he assigned for it is incomplete, the genus is a good and natural one. It has, however, since been merged into *Odontoschisma* by both Gottsche and Lindberg; and as I have been asked on various hands to say why I cannot subscribe to the sentence of these eminent Hepaticologists, I proceed to justify my course, first, by giving a clear summary of the main characters by which *Adelanthus* is essentially distinguished from *Odontoschisma*; and, secondly, by adding detailed descriptions of a few species of each genus.

Odontoschisma, Dumort.	Adelanthus, Mitt.
Stems mostly procumbent, arched —sometimes repeatedly—and rooting at the descending flexures.	*Stems* suberect, decurved, or circinnate only at the apex.
Leaves obliquely or almost longitudinally inserted, distinctly succubous, assurgent (pointing *upwards*), equably concave, with a slight marginal inflexion all round, quite entire, very rarely emarginate. *Cells* nearly equilateral (6-gonous) and uniform, except the marginal ones, which are often parallelogramic.	*Leaves* mostly transversely inserted so that they are often scarcely to be called either succubous or incubous, although decurrent at the antical base, decurvo-secund (pointing *downwards*), strongly incurved at the antical margin, plane and usually sharply-toothed at the postical, often vittate with the enlarged and discoloured medial cells in the lower half.
Perianth slender, sometimes inordinately elongated, uniformly trigono-prismatic.	*Perianth* obovate or fusiform, inflated, in the upper part faintly 3-5-angled (3-4-angled in *decipiens*; 3-5-angled in *decurvus*; 5-angled in *unciformis*).
Calyptra small, thin, and tender (*supera*), only one cell in thickness.	*Calyptra* large and thick (*semi-infera*)—in *decipiens* 3 cells, in *decurvus* 4 cells, in *unciformis* 6 cells thick, in the lower half.

Odontoschisma, Dumortier.

Pleuroschisma, § 1, *Odontoschisma*, Dum. Syll. Jung. Eur., 68 (1831); *Odontoschisma*, Ejusd. Recueil i., 19 (1835); *Sphagnoecetis*, Nees in G. L. et N. Syn. Hep., 148 (1845).

1. Odontoschisma Sphagni, (Dicks.), Dum.

Jungermannia Sphagni, Dicks. Crypt. Brit. i., 6 (1785); Hook. Brit. Jung., t. 33 (ex parte).—*Sphagnoecetis communis α. vegetior*, Nees in Syn. Hep., 68.—*Odontoschisma Sphagni* (Dicks.), Lindberg. Not. Soc. F. Fl. Fenn., 357 (1874.)

Var. *amazonica:* perianthiis apice integerrimo v. parum fimbriato conniventi-clausis, pro capsulæ emissione rima infra-apicali dehiscentibus, raro circumscissis v. valvatis.

Folia ·75 × ·65, ·8 × ·7; cell. $\frac{1}{35}$; bracteæ int. ·8 × ·35, 1·1 × 5; per. 2·3 × ·7, 2·5 × ·5, 2·0 × ·4; cal. 1·0 × ·5; capsulæ valvulæ ·8 × ·25—·3; bracteæ ♂ ·4 × ·2.

Prostrata, in plagas latas tenues diffusa, vel supra muscos reptans, viridis albescens roseave. *Caules* pollicares longioresque, *tota fere longitudine æquifoliati*, basi ipsa radicellis sæpeque flagellis radicantes, postea sursum arcuantes matriceque liberi, flagello demisso (raro 2 v. 3) *iterum iterumque radicantes arcuantesque*; e facie postica ramos æquifoliatos, sæpe subdivisos, paucos—parvi-

folios gemmiparos nullos—emittunt; cæterum plus minus radicelliferi, raro arhizi. *Flagella* sat valida alba flexuosa omnino aphylla, radicellis trichoideis sparse densiusve vestita.

Folia arcte (ad ½) imbricata, plus minus patentia vel *sæpe assurgenti-secunda*, basi subobliqua fere longitudinali inserta, antice perpaulo decurrentia, *suboblique ovato-rotunda vel late ovato-oblonga*, rotundata raro truncato-retusula, e margine toto incurvulo subconcava, *cellulis incrassatis marginata* integerrima; *cellulæ* mediocres rotundo-hexagonæ v. subquadratæ, ad angulos incrassatæ, minutissime verruculosæ, ex endochromio copioso opacæ, solum ipso centro pellucidæ, foliorum vetustorum evacuatæ.

Foliola præminuta, ad squamulam ovatam integram bifidamve reducta, hic illic sed præcipue ramorum apicem versus obvia, *sæpe* tamen *obsoleta nullave.*

Flores dioici, postici. *Ramuli* ♀ breves tristichophylli; *bracteæ* subtrijugæ, interiores sensim majores, arcte imbricatæ, *apice recurvulæ*, cuneato-oblongæ fere ad medium acute bifidæ, laciniis subinæqualibus acutis *integerrimis*, elongato-pellucido-areolatæ (aliorum florum tamen magis opacæ); *bracteola* intima sæpe basin versus dente lobulove aucta, cæterum bracteis conformis.

Perianthia foliis caulinis triplo longiora, albida subroseave, anguste fusiformia subulatave, sæpe subfalcata, obtuse trigona triplicataque, *ore conniventi-clauso subintegerrima*, pro capsulæ emissione nunquam apice ipso, nec nisi rarissime circumscissim rupta, pro more *hinc sub apice rima brevi hiantia, spathæformia. Calyptra* perianthio plus duplo brevior, pyriformis, vel latior et obovato-globosa, *tenuissima, cellulis unistratis* valde inæquilateri-3-7-gonis pellucidis areolata, apice demum rupta laceraque, basi pistillidiis sterilibus ad 20 obsita.

Capsula calyptra paulo brevior, pedicello elongato suffulta, cylindrico-oblonga, ab ipsa basi 4-valvis, valvulis inæquilatis rufo-badiis validis.

Amenta mascula e caulis facie postica, basin mediumve versus orta, tenuia, albida, pellucida, incurva circinnatave. Bracteæ 10-12-jugæ, arcte imbricatæ, apice tamen patulæ, subsecundæ, ovato-oblongæ-ligulatæve, cymbiformi-concavæ, ad ¼ acute bifidæ, segmentis obtusis. *Antheridia* solitaria magna globosa brevipedicellata, demum a basi ad apicem usque hinc hiantia. *Bracteolæ* ubique obviæ, bracteis duplo breviores lineari-ligulatæ, apice bispinulosæ. —Unicum exemplum inveni caulis primarii apice in spicam masculam robustum viridem commutati!

Var. *europæa:* perianthiis apice valvatim dehiscentibus, valvulis (sub 6) plus minus incisis ciliatisque.*

Hab.—In ericetis turbariis totius Europæ Americæque borealis temperatæ, *Sphagnis* et præcipue *Leucobryo glauco* irrepens. In Scandinavia (fide Lindberg) multo rarior est quam in Germania boreali.—In sylvis umbrosis humilioribus fl. Amazonum, præcipue decus ejus tributarios boreales, Rio Negro, Trombetas, etc.,

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* Caracteres literis italicis impressis maximi momenti sunt. In speciebus perpaucis describendis, vix operæ pretium est caracterem specificum e plena descriptione excerpere.

necnon per totam regionem graniticam fluminum Orinoco, Casiquiari, Uaupés, etc.; ad arborum pedem radicesque exsertas, raro supra truncos putrescentes, sæpissime aliis Hepaticis Mucisque (*Mastigobryis*, *Lejeuneis*, *Leucobryo Martiano*, etc.) consociata easdemve infestans.

It was in the forests of the Trombetas, one of the lower affluents of the Amazon, that I first gathered *Odontoschisma Sphagni* in South America. Afterwards I saw it along the whole course of the Rio Negro, especially towards and within the frontier of Venezuela; and it abounds and fruits freely on the Uaupés, Casiquiari, and Upper Orinoco, where it grows chiefly in the caatinga forests, and, along with other Hepatics (*Mastigobrya*, *Micropterygia*, &c.) and Mosses (especially *Leucobryum Martianum*), it builds up soft cones around the foot of little trees, or spreads in broad green, whitish, or rosy patches over the exserted roots of larger trees. Very rarely is it seen on the earth itself; and when on prostrate trunks it mostly overruns a living growth of other species, such as choose naturally a matrix of decaying wood. It never grows on *Sphagnum*, although there is a *Sphagnum* (*S. Negreuse*, Spruce) not unfrequent on the rocky banks of the Rio Negro, and often forming a white swelling border to granitic, wooded islands in and above the cataracts. It grows on the bare rock, and when the river is low—that is, from July to February—it affords a habitat to multitudes of pretty little plants: *Drosera tenella*, H.B.K.; several *Utricularias* with slender (sometimes simple) leaves, growing erect among the flower-scapes, and often destitute of utricles, such as *U. trichophylla*, Spruce, *U. longiciliata*, A. DC., *U. cornuta*, Mx., &c.; two or three *Selaginellas*, and some others; but no *Odontoschisma* ever grows on it. As the Rio Negro approaches its flood-level, the Sphagnum becomes submerged, and sends out under water slender sparsely-branched shoots, a foot or more long, which, as they sway to and fro in the rapid current, look like anything but a Sphagnum, so that until I fished some of them out I took them for the leaves of one of the *Podostemons* that abound in the cataracts.*

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* On our own moors I have far oftener seen *Odontoschisma Sphagni* growing on *Leucobryum glaucum* than on *Sphagna*. Now that the steam-plough is fast obliterating the small remnant of moors in the Vale of York, it is worth while recording something about the *Leucobryum*, as seen on Strensall Moor, five to six miles north of York. There it forms immense rounded hassocks, some of which in my youth were as much as three feet high; and although the ground whereon they grew is now drained and ploughed out, I am told that on another part of the moor there are still left a few hassocks about two feet high. When the late Mr. Wilson first saw them, thirty years ago, he took them at a distance for sheep; as he approached them he changed his mind for haycocks; but when he actually came up and saw what they were he was astonished, and declared he had never seen such gigantic moss-tufts elsewhere. [Many years afterwards I was forcibly reminded of them by the large, whitish, glossy hassocks of *Azorellas* on the paramos of the Andes.] During seven consecutive years that I saw them frequently, I could observe no sensible increase in height. The very slight annual outgrowth of the marginal branches is comparable to the outermost twigs of an old tree, and is almost or quite counterbalanced by the soft, imperfectly elastic mass incessantly decaying and settling down at the base; so that these tufts of *Leucobryum* may well be almost as secular as our Oaks or Elms; and some of them might even be coming into existence, if not so far back as when the warders of Bootham Bar and Monk Bar (the northern entrances to York) used to hear the wolves

I have compared the Amazon plant with specimens of *O. Sphagni* from various part of Europe and North America, and can find no essential difference. Fine fruiting specimens from Lindberg (e monte Hunneberg, Suecia) have the leaves nearly twice as large, and sometimes broader than long, but always ovato-orbicular—broadest a little below the middle—concave, assurgent, indistinctly margined with quadrate cells, and of the same internal structure as in the South American plant. Bracts of ♀ flower bifid, segments sometimes laciniato-ciliate. Perianth above three times as long as the stem-leaves, 6-cleft at the apex by the protrusion of the capsule, laciniæ subciliate. The last character affords the only tangible distinction from the variety *amazonica*, which has the perianth at first closed, finally bursting like a spathe by a lateral subapical slit; rarely circumscissile, and very rarely indeed split at the very apex as in the European form, but less regularly.

The fertile plant is rare in Britain, but has been gathered by

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howling beneath their feet on the bleak winter nights, at least whilst the "last wolf" was still prowling in the Forest of Galtres.

Strensall Moor, Stockton Forest, Langwith Moor, &c., are all relics of the Forest of Galtres, an ancient royal demesne of the Saxon kings, in which roamed the stag, bear, wolf, and wild boar. A perambulation made in the ninth year of Edward II. found it to extend from the walls of York northwards nearly twenty miles, viz., to Isurium (Aldburgh), and eastwards to the river Derwent. Several hamlets had sprung up on it, and a few solitary granges—moated round to protect the inmates from wolves, biped and quadruped. [One of these moated granges was still the only habitation on Langwith Moor in 1842, when I showed Mr. Borrer *Jung. Francisci* in fruit growing close by.] Camden calls it "Calaterium Nemus, vulgo *The Forest of Galtres* . . . arboribus alicubi opacum, alicubi uliginosa planitie madescens." In his time it stretched northwards only to Craike Castle and the source of the river Foss : "*Fossa*, amnis piger . . . . originem habet ultra Castellum Huttonicum, terminatque fines Calaterii nemoris, &c." (*Brit.*, fol. 1607, p. 588). What remains of it now is only here and there a fragmentary "uliginosa planitie"—still rich in *Sphagna*, bog *Hypna*, and numerous other Mosses and *Jungermanniæ*—to say nothing of nobler plants —and in the drier parts adorned with wide beds of *Cetraria islandica* and *Cenomyce rangiferiana*, associated with *Dicranum spurium*, *Bartramia arcuata*, *Racomitrium lanuginosum* (often fertile), and other tall Mosses.

Tradition reports—but adds no date to the supposed fact—that the last wolf in England was killed on the borders of the Forest of Galtres, at Stittenham, two miles from where I am writing, by one of the Gowers, of which noble family Stittenham was (and still is) an ancient possession. The crest of the Gowers is "a wolf passant argent," &c., and over the family vault in the neighbouring church of Sheriff-Hutton are suspended the funereal trophies of a Gower, viz., a casque, gauntlets, &c., and a pennon, now faded, but said to have been blazoned with the representation of a combat between a man and a wolf. Whether, however, the badge was assumed from that heroic action, or the tradition was founded on the badge, let the heralds decide.

I conclude this note by earnestly beseeching our local botanists to lose no time in exploring the moors that still remain untouched by cultivation in the Vale of York and elsewhere. On the wide plain between the Ouse and the foot of the wolds there are still left several patches of moor which have never been thoroughly examined for Cryptogamia. On one of these—Barmby Moor—I found the rare *Scalia Hookeri*, Lyell, in fruit on November 5th, 1842, and I suppose I and Mr. Curnow are the only living botanists who have gathered it in Britain; but Gottsche finds it near Hamburg, and Lindberg at Helsingfors. In 1856 I gathered a second species, *Scalia andina*, MSS.—thrice the size of its European congener—in the eastern Andes of Peru.

myself on *Leucobryum* on Strensall Moor. It has smaller leaves than the Swedish, but of the same ovato-orbicular form—not "elliptico-orbiculata," as usually described—usually longer than broad, nearly uniform in size on the same plant, but smaller on some plants than on others (1·5×1·3, 1·0×1·0; 9×8$^{\text{mm.}}$); the branch leaves distinctly margined. Inner bracts 1·6$^{\text{mm.}}$ long, bifid only to one-fourth, segments sublaciniate. Perianth 4 or even 6$^{\text{mm.}}$ long—*i.e.*, 3 to 6 times as long as the leaves, the mouth ciliate, rarely valvately cleft, but irregularly ruptured by the protruding capsule, which is oblongo-cylindrical, twice as long as broad.—This long-flowered form is undistinguishable from Taylor's *Sphagnoecetis longiflora* (vide "Syn. Hep.," 688) which he had from Jamaica. Even the *Jung. prostrata* of Swartz, usually considered distinct, may be only a long-leaved form of *O. Sphagni.* Jamaican specimens, however, from Swartz's own herbarium, have oblong or oval leaves, nearly twice as long as broad, beautifully margined with a row of closely-set quadrate cells: in "Syn. Hep." they are described as "margine dense striata."

(*To be continued.*)

LES ROSES DES ALPES MARITIMES.

PAR LE DR. H. CHRIST À BÂLE.

(*Concluded from p.* 142)

VI. TOMENTELLÆ.

Jam jam in Diario "Flora" dicto. anni 1875, n. 18 et 19 explicite de formarum serie locutus sum, Tomentellis addicenda, sed foliolis angustioribus Sepiaceas æmulante, quam primus Scheutzius Wexionensis in opusculo "Studier," 1872, pag. 20, distinxit nomineque *Ræ. sclerophyllæ* notavit. Confer etiam Journal of Bot., April, 1875.

Hujus seriei consodalem amicus Burnat in Alp. Marit. detexit, quam nomine

17. *R. tomentellæ*, f. *Burnati*,

illustrare mihi cordi est.

Egregia stirps aculeis maximis gaudet, basi latissimæ oriundis, leviter curvatis, compressis, pollicaribus, testaceis, nitentibus, ramos undique tegentibus. Etiam petioli 3 usque ad 5 aculeis validis albis incurvis armati sunt. Foliis trijugis, petiolis pilosis, pæne eglandulosis, stipulis ovatis dilatatis glabriusculis, vix glandulosis, foliolis lanceolato-ovatis ad basin attenuatis flavo-viridibus, junioribus rubidis, superne glabris, infra, in primis ad nervos pubentibus, illorum *Rosæ Sepium* paulum majoribus, biserratis, dentibus profundis, argutis, flexuosis, glandulis sessilibus nigris hic illic terminatis.

Ramis floriferis 1- ad 3- floris, bracteis latis ovalibus suffultis; pedunculis receptaculo longioribus, nudis, receptaculo ovali, sepalis longissime appendiculatis, appendicibus lanceolato-linearibus, argute acuminatis, eglandulosis; sepalis post anthesin reflexis. Stylis pilosis, brevibus. Corolla rosea, mediocri.

Ludit foliolis latioribus, ovatis, fere simpliciter serratis. Tota planta fere eglandulosa.

Habitus inter Sepiaceam et Tomentellam glabratam. Recedit a typo *Suecico sclerophyllæ*, Scheutzii, glandulis rarioribus, foliolis haud cartilagineis ; aculeis in genere maximis peculiaris. Typum tomentellæ foliolorum ambitu angusto aculeisque falcatis nec late cuneatis fugit.

Loc.—Mont Farghet, au dessus de l'Escarène, vers 4 à 500 m. alt. s. m., 11 Juin, 1875. Mont Siruol, versant de Libaré, près Venanson, 20 Juill., 1875. Sous Bouyon, vers l'Esteron, 26 Mai, 1875, alt. env. 600 m. s. m.

VII. CANINÆ GLANDULIFERÆ.

18. *R. canina*, L., f. *dumalis*, Bechstein.

Sed aculeis validis frequentissimis fere rectis, ita ut *Ræ. orthacanthæ*, Kerner (id est Lutetianæ aculeis rectis diversæ) accedat.

Loc.—Mont Farghet, au dessus de l'Ecarène, 11 Juin, 1875.

19. *R. canina*, L., f. *suffulta.*

R. glaberrimæ, Dumortier, propinqua, parvi- et albi- flora, stylis glabratis brevissimis, disco conico, foliolis lucidis luteo-viridibus latissime ovatis acutis, cuspide protracto, simpliciter et profunde dentatis aut irregulariter bidentatis; tota planta vix, nisi in apice dentium, glandulosa ; sed recedens corymbo multifloro, stipulis numerosis latis denticulatis suffulto et quodammodo involucrato, ideoque facie *Ræ. Reuteri*, quanquam pedunculis receptaculum minutum ovatum æquantibus.

Loc.—Vall. inf. de la Gordolasca, 27 Juin, 1875.

20. *R. rubrifolia*, Villars.

Loc.—Cluse de St. Auban (Alp. Marit.), 30 Mai, 1875, fl. vix Aiguines (Var) Albert leg.! 27 Juin, 1872, et 17 Juill., 1873.

21. *R. montana*, Chaix, apud Villars; Ardoino, Fl. Alp. Marit., 129.

Loc.—Vallon du Boréon, près St. Martin Lantosque près le confluent de la Salèse, 8 Juill., 1875, florens. Vallon de Libaré, près St. Martin Lantosque leg. Thuret. Amen près Puget Teniers l. Thuret. Col delle finestre l. Barlet in Herb. Huet.

VIII. CANINÆ PILOSÆ.

22. *R. dumetorum*, Thuill., f. *obtusifolia*, Désvaux ; Ardoino, Fl. Alp. Marit., 128.

A typo diversa aculeis pro regione et climate raris, mediocribus, etiam in petiolio plerumque deficientibus, foliis ramorum florigerorum bijugis, petiolis ita ut tota planta eglandulosis, foliolis parvis, late ovatis, infernis obtusis, superioribus breviter acuminatis, duriusculis, superne brevissime puberulis, infra cum petiolo dense pubescentibus, colore cinerascente farinoso, dentibus simplicibus, procumbentibus haud profundis, obtusis, subcrenatis ; corymbis subtrifloribus, pedunculis receptaculo longioribus, bracteis haud conspicuis, receptaculo ovato aut clavato, stylis brevibus glabriusculis, sepalis angustis longe appendiculatis, reflexis, corolla parva albida. Fructus ovatus, atropurpureus.

Est forma Galliæ meridionalis et occidentalis, habitu peregrino.

Loc.—Chemin du Mont Farghet, près l'Escarène, 11 Juin, 1875, vix deflorata ; 27 Juill., fructibus immaturis.

Ludit foliolis minus pubescentibus, superne læte viridibus, dentibus acutioribus aculeisque rectiusculis seu rectissimis :

Loc.—Entre Sigale et Aiglun, vall. de l'Esteron, 29 Mai, 1875, florens.

23. *R. dumetorum*, Thuill., f. *capitata*.

Differt a forma *Thuillieri*, Christ, R. d. Schweiz, 185, quam pro typo habui, inflorescentia capitata, id est pedunculis brevioribus, ita ut totus corymbus bracteis circumdatus floresque foliis bracteolaribus superati sint. Planta robusta, ob inflorescentiam *Ræ. coriifoliæ* per similis, sed floribus albidis stylisque glabrescentibus ad veram *Rm. dumetorum* pertinens.

Loc.—Vallée inférieure de la Gordolasca, 26 Juin, 1875.

IX. Synstyleæ.

24. Prostat *R. arvensis*, f. *transalpina*, Christ, R. d. Schweiz, 197, pube nitidula insignis, quæ jam in Italia superiore lecta.

Loc.—Mont Farghet, sur l'Escarène, 11 Juin, 1875.

Adest porro forma sine dubio hybrida, glandulis per ramos undique sparsis mirabilis

25. *R. arvensi*=*Sepium*.

Frutex debilis, virgatus, suberectus, uti videtur humilis ; omnes rami pube glandulifero irregulariter sparsi, aculeis brevibus aduncis hic illic armati. Stipulis ovatis, cum petiolis glandulosis, hisce aculeatis ; foliolis trijugis, lanceolato-ovatis cuneatis, grosse bidentatis *Ræ. Sepium* foliola omnino æmulantibus, utrinque nudis, tenuibus.

Ramuli biflori aut uniflori, bracteis carentes, pedunculi longissimi, indumento glanduloso pubescentes ita ut receptaculum parvum ovatum et sepala ovata breviter cuspidata, appendiculis brevissimis, linearibus raro prædita ; styli columnam longam lævem efformantes, petala alba, fructus uti videtur abortivus, ovato-clavatus.

Foliis *Ræ. Sepium*, quorum indumentum glandulosum mirum in modum ramis contigit ; floribus *Ræ. arvensis*.

Loc.—Mont Farghet, sur l'Escarène, 11 Juin, 1875, florens.

26. *R. sempervirens*, L., f. *scandens*, Mill. sec. ; Boreau, Fl. du Centre.

Loc.—La Brague, près Antibes, 8 Juin, 1875. Entre Drap et l'Escarène, 11 Juin, 1875.

27. *R. sempervirens*, L., f. *microphylla*, DC.

Forma major, longe lateque prostrata et radicans.

Loc.—Vaugrenier, près Antibes, 8 Juin, 1875.

Forma minor, typica.

Loc.—Naies aux bords des champs à St. Raphael, près Frejus (Var), 7 Juin, 1873, leg. Huet.

X. Gallicanæ.

28. *R. gallica*, L., f. *Provincialis*, Aiton.

Differt a typo *gallicæ* (syn. *R. Austriaca*, Crantz, *R. pumila*, Clus. Jacq.) aculeis raris, aciculis creberrimis, foliolis lucentibus amplis elliptico-orbicularibus, late et breviter dentato-crenatis, corolla plerumque semiplena atro-purpurea, colore vinoso.

Loc—Aux Mayons, près le Luc (Var), Mai, 1875, l. Hanry.

AN ENUMERATION OF THE FUNGI COLLECTED AT THE CAPE OF GOOD HOPE DURING THE STAY OF THE ENGLISH TRANSIT OF VENUS EXPEDITION IN 1874.

BY THE REV. M. J. BERKELEY, M.A., F.L.S.

AT the recommendation of Dr. Hooker, P.R.S., collections were made of some of the lower Cryptogamic plants in the immediate neighbourhood of Cape Town during the detention at the Cape of the English Transit of Venus Expedition to Kerguelen Island. The gatherings of Fungi were obtained between the last week in July and the first week in September inclusive. The collection comprises the following species :—

Genus *Agaricus*, L.

1. *A.* (*Amanita*) *muscarius*, L.

HAB.—Under Pine trees on the Cape Flats, between Rondebosch and Claremont. July 31. Frequent; Eaton.

2. A. (*Omphalia*) PAUROPHYLLUS, *n.sp.*

Pileo convexo, centro depresso, sulcato, albo (in spiritu methylato cum glycerino, postea griseo); stipite curvato, glaberrimo, e basi incrassata orienti; lamellis paucis, postice rotundato-liberis.

HAB.—On the bark of a *Cycas* in the Botanic Gardens, Cape Town. July 29. Solitary; Eaton.

Pileus 1 line across; stem 1 line high, ⅓ line thick; gills about 8 in number. Closely resembles *A. stellatus*, Sow., but in that species the gills are decurrent.

3. *A.* (*Clitocybe*) *laccatus*, Scop.

HAB.—On burnt earth (in a burnt clearing), Groote Schuur, Rondebosch. August 28. Common; Eaton.

Spores globose, granulated. There is also a brown-tinted form, apparently a variety of the same species. The spores are alike in both forms.

4. *A.* (*Pholiota*) *spectabilis*, Fr.

HAB.—Foot of Table Mountain, near the town; Eaton.

5. *A.* (*Flammula*) *flavidus*, Schæff., var.

HAB.—On stumps, at the base of Table Mountain; Eaton.

For the present this must be considered a form of *A. flavidus* (from which it differs in its very pale spores), since without notes as to its mild or austere flavour it is not safe to distinguish it as a new species.

6. A. (*Galera*) EATONI, *n.sp.*

Pileo campanulato, lævi; stipite glaberrimo, basi fortiter strigoso; lamellis postice attenuato-adnexis.

HAB.—On dead bark at the base of Table Mountain; Eaton.

Pileus 2 lines across; stem 1 inch high, not ½ line thick. Differs from all allied species in its strongly strigose base.

7. *A.* (*Naucoria*) *semiorbicularis*, Bull.

HAB.—Near the gaol and the harbour, Cape Town. August 28. Scarce; Eaton.

7a. *A.* (*Psalliota*) *campestris*, L.

HAB.—Vineyards at Wynberg. Not in the collection; Eaton.

Genus *Marasmius*, Fr.

8. M. USTORUM, *n.sp.*

Pileo e convexo deplanato, læte cervino, quandoque centro obscuriore; stipite subæquali, deorsum brunneo; lamellis crassis pallidioribus, margine tomentosis; interstitiis lævibus, postice emarginatis.

HAB.—On burnt earth (in a burnt clearing) at Groote Schuur. August 28; Eaton.

Pileus $1\frac{1}{4}$ inch across; stem $1\frac{1}{2}$ inch high, $\frac{1}{8}$ inch thick; spores pallid, $\frac{1}{2500}$ inch long. Apparently a very distinct species.

Genus *Panus*, Fr.

9. *P. Wrightii*, B.

HAB.—Foot of Table Mountain, near the town; Eaton. Royalty Ids. and New Caledonia; Mr. Brazier.

The non-sulcate form of the Cuban species. Eaten by the Chinese.

10. P. QUAQUAVERSUS, *n.sp.*

Pileis congestis, reniformibus, lamellisque postice pallido-velutinis, brunneis; stipite nullo; mycelio filamentoso.

HAB.—Foot of Table Mountain, near Cape Town, on stumps, &c.; Eaton. Binding together vegetable fragments by the pallid, branched, filamentous mycelium.

Pilei imbricated, some with the hymenium superior, brown as well as the thick, rather distant, entire gills. The mode in which the pilei are opposed to each other is very curious.

Genus *Schizophyllum*, Fr.

11. *S. commune*, Fr.

HAB.—Grounds of Government House. July 29. Common also on dead trees at the foot of Table Mountain; Eaton.

Genus *Boletus*, Fr.

12. B. SUBFLAMMEUS, *n.sp.*

Pileo convexo, lævi, luteo; stipite tenui deorsum citrino; poris spadiceis, irregularibus, amplis, decurrentibus; mycelio sulfureo.

HAB.—Foot of Table Mountain; Eaton. Growing amongst dead leaves, to which it is attached, as well as to quartzose granules, by the ample sulphur-coloured mycelium.

Pileus 2 inches across; stem scarcely 1 inch high, $\frac{1}{4}$ inch thick; spores pale, oblong, about $\frac{1}{1500}$ inch long.

Genus *Polyporus*, Fr.

13. *P. sanguineus*, Fr.

HAB.—Foot of Lion Mountain, just below the Kloof Road, on Oak stumps; Eaton.

14. *P. versicolor*, Fr.

HAB.—Grounds of Government House, and base of Table Mountain. Common; Eaton.

15. *P. hirsutus*, Fr.

HAB.—Foot of Table Mountain; Eaton.

16. *P. vaporarius*, Fr.

HAB.—Foot of Table Mountain; Eaton.

Genus *Dædalea*, P.

17. D. EATONI, *n.sp.*

Pileo dimidiato, imbricato, cervino, velutino, pilis postice fasciculatoconjunctis; margine sterili; hymenio obscuriore; poris elongatis; contextu molli.

HAB.—Foot of Table Mountain; Eaton. On dead wood apparently sunk into the ground.

About 3 inches wide, 1 inch long; pores $\frac{1}{60}$ inch wide. The margin varies in the degree of obtuseness. Allied to *D. unicolor*, Fr.

Genus *Stereum*, Fr.

18. *S. hirsutum*, Fr.

HAB.—Grounds of Government House, and base of Table Mountain. Abundant; Eaton.

19. *S. vorticosum*, Fr.

HAB.—Foot of Table Mountain; Eaton.

A form rather paler than that described by Fries, judging from the dried specimens; but exactly intermediate between *S. purpureum*, Fr., and *S. hirsutum*, Fr.

Genus *Tremella*, Fr.

20. *T. epigæa*, B. & Br. Refer Ann. of Nat. Hist., October, 1848, no. 373.

HAB.—On the gravel at the base of the steps in front of the dining-room window of Government House, growing sparingly upon the clayey sand, between the stones. Colour dirty white, resembling paste; Eaton.

So far as I can judge from the specimens in spirits and glycerine, it is not essentially different from the British species, though slightly dingy in colour.

Genus *Hirneola*, Fr.

21. *H. rufa*, Fr. Syn. *Exidia rufa*, B., Ann. of Nat. Hist. x., p. 384.

HAB.—Base of Table Mountain; Etn. Also Royalty Islands and New Caledonia; Mr. Brazier. Eaten, like some other species of *Hirneola*, by the Chinese.

Genus *Scleroderma*, P.

22. *S. vulgare*, Fr.

Genus *Æthalium*, Lk.

23. *Æ. septicum*, Fr.

HAB.—Bursting through the bark of a tree in the grounds of Groote Schuur, Rondebosch, the Governor's country seat. July 28; Eaton.

Genus *Stemonitis*, Gled.

24. *S. fusca*, Roth.

Hab.—Groote Schuur. July 28; Eaton.

Genus *Puccinia*, P.

25. *P. graminis*, P.

HAB.—Foot of Table Mountain; Eaton.

Genus *Trichobasis*, Lév.

25a. *T. rubigo-vera*, Lév., Cooke.

HAB.—On species of *Oxalis*, foot of Table Mountain; Eaton.

Genus *Æcidium*, P.

26. *Æ. leguminosarum*, Reb.

HAB. Foot of Table Mountain; Eaton.

Genus *Cladosporium*, Lk.

27. *C. herbarum*, Lk.

HAB.—On the pileus of *Boletus subflammeus*.

Genus *Morchella*, Dill.

28. *M. esculenta*, P.

HAB.—Groote Schuur. July 28; Eaton.

An almost cylindrical variety, with the stem studded with little transverse dark specks.

Genus *Peziza*, L.

29. *P. vesiculosa*, Bull.

HAB.—On the south side of Lion Mountain, above the Kloof Road. Sparingly upon damp clayey soil; Eaton.

Genus *Capnodium*, Mont.

30. *C. fuligo*, B. & Desm. Refer Journ. Hort. Soc. iv., p. 250.

HAB.—On *Brabeium stellatifolium*. Presented by Dr. Monsel. Base of Table Mountain.

31. *C. australe*, Mont.

This appears to be a stylosporous form.

FLORULA CHELONESIACA; OR, A LIST OF PLANTS COLLECTED IN JANUARY, 1874, IN THE ISLAND TORTUGA, VENEZUELA.

BY DR. A. ERNST.

THE island Tortuga is situated between 10° 53' and 11° N.Lat., and 67° 28' and 67° 49' W., Paris, about fifty miles north from the coast of Venezuela and fifty-two miles north-west from the island of Margarita. It measures twelve miles from east to west, and six from north to south. It is a raised coral reef, with an almost level surface, and has a very narrow beach. The interior rises to 100 feet above the sea, and is covered with numberless flakes of limestone, sometimes measuring a square yard, and so hard and homogeneous that they sound like bells when struck with a hammer. Between them there are here and there patches of a more or less circular outline, covered for about two feet deep by calcareous sand. On these, as well as in the furrows between the limestone-flakes, there is a considerable, and sometimes even a luxuriant vegetation, whilst but a few localities on the shore are covered by Mangrove thickets. The western part of the island presents a richer vegetation than the eastern part, probably on account of the rather strong trade-winds. The island has no wells, but there is a spot about the middle of the south coast where a slightly brackish water filters from a crevice in the porous rock. There are no inhabitants in the whole island, which is only visited now and then by fishermen, as there is plenty of good fish, turtles, lobsters (*Palinurus guttatus*), and oysters (*Ostrea parasitica*).

I collected the following plants; the vernacular names I learned from the sailors of the small craft in which I made the excursion.

1. *Cakile æqualis*, L'Hér. Rare on the beach.
2. *Capparis Breynia*, Jacq. This handsome shrub is called *Olivo* by

the fishermen, and forms the most characteristic feature of the vegetation.

3. *Capparis subbiloba*, H.B.K. (*Palo de mostro*, i.e., mustard-wood). I was told that the same plant is called *Arará* by the inhabitants of Rio Hacha (New Granada), a name not mentioned in Triana and Planchon's "Prodr. Floræ Novo-Granat.," 76. Grows only in the western part of the island.

4. *Samyda glabrata*, Sw. (*Manzana*, i.e., Apple). The specimens were in fruit, and only very few were seen.

5. *Jatropha Kunthiana*, Müll. (*Guaritoto*). Very common in the eastern part.

6. *Croton rhamnifolius*, Kth. (*Carcanapire*). Not uncommon.

7. *Argyrothamnia Fendleri*, Müll. Common in the eastern part.

8. *Hippomane Mancinella*, L. Rare.

9. *Euphorbia adenophora*, Bertol. Common on the sands, the specimens forming sometimes circular patches of one foot in diameter.*

10. *Euphorbia buxifolia*, Lam. Rare.

11. *Mollugo verticillata*, L. One specimen only was collected.

12. *Portulaca pilosa*, L. Rather common.

13. *Sesuvium portulacastrum*, L. Common.

14. *Suriana maritima*, L. (*Romero*). Common.

15. *Salicornia ambigua*, Michx. The low foreland in the eastern part is almost entirely covered by this very curious plant.

16. *Batis maritima*, L. Very common on the old salt-ponds, which are now abandoned.

17. *Obione cristata*, Moq. On the sands in the western part.

18. *Lithophila muscoides*, Sw. Rather uncommon between stones.

19. *Alternanthera ficoidea*, R.Br. Common.

20. *Bastardia viscosa*, Kth. One single specimen was seen in the western part.

21. *Pavonia racemosa*, Sw. Rare in the Mangrove thickets.

22. *Gossypium barbadensa*, L. A few poor-looking specimens were observed on the south coast; the flowers and pods were very small, though agreeing in every respect with the description given by Parlatore. Most probably not indigenous on the island; the seeds may have been brought there either by fishermen or by currents from Margarita.

23. *Melochia tomentosa*, L. (*Basora colorada.*) Common.

24. *Corchorus hirsutus*, L. More common in the western part than in the east.

25. *Guajacum officinale*, L. (*Guayacan*). Common. I saw several stems, split down to the ground, which measured not less than twelve to fifteen inches in diameter. As the tree grows very slowly, they must be of a considerable age.

26. *Castela erecta*, Turp. (*Retama*). Common on all the sands. The same species is likewise very abundant in the island of Margarita and on the opposite coast of the mainland.

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* I may mention here that *Euphorbia prostrata*, Ait., a very common plant, growing even between the stones in some streets of Caracas, is often attacked by a species of *Æcidium*, and in this case its prostrate manner of growth is entirely altered, the stems taking an upright direction.

27. *Myginda Rhacoma*, Sw. Not uncommon in the western part.

28. *Mauria heterophylla*, Kth. (*Mara; Palo de sia* in the island of Curazao). In the western part very common.

29. *Tephrosia cinerea*, Pers. (*Indigo* in Curazao). Very common on the sands.

30. *Rhynchosia minima*, DC. (*Ragadischi* in Curazao).

31. *Pithecolobium oblongum*, Benth. (*Guichere* in Margarita). Not common.

32. *Rhizophora Mangle*, L. (*Mangle colorado*). Rather rare on the coast.

33. *Laguncularia racemosa*, G. (*Mangle negro*, i.e., black Mangle, the leaves getting almost black by drying; whilst the vernacular name of the foregoing species is due to the colour of the wood). Common.

34. *Conocarpus erectus*, L. (*Botoncillo*). Some very fine, tree-like specimens grow on the watering-place mentioned before.

35. *Passiflora leariloba*, Hook. f. (*Finta*). Not common.

36. *Melocactus communis*, DC. (*Bucha*). Very common, and indeed sometimes an obstacle on account of its spines, which penetrate like needles even the leather of the boots. The rose-coloured berries have an agreeable sweetish-acid taste, and are the favourite food of the sparrow-parrots (*Psittacula passerina*, L.), which visit the island in numerous flights. Occasionally a bifurcation of the stem was observed in this plant, probably due to some former injury. It is strange that no species of *Mammillaria* grows on the island, although there are several on the coast of the neighbouring mainland.

37. *Cereus Swartzii*, Griseb. In the centre of the island there is a specimen the height of which I calculated from the length of its shade; it was fifty-six feet high! Three feet above the ground the stem had a diameter of eighteen inches; at about thirty feet it divided into fourteen large branches. I intended taking part of the stem with me; the plant was therefore cut down, but it proved to be too difficult a job for the two men who accompanied me, to carry it nearly three miles to the shore, so that with much regret I was compelled to leave it, the destruction of this noble specimen being thus entirely useless.

38. *Cereus triangularis*, Haw. Not uncommon in the western part.

39. *Opuntia spinosissima*, Mill.

40. *O. triacantha*, Haw. (*Guasábara*). Both very common and troublesome denizens of the island.

41. *Scævola Plumieri*, L.] One rather poor specimen was found, and its identification is not quite certain.

42. *Jacquinia armillaris*, L. (*Barbasco*). Common in the western part.

43. *Ibatia albiflora*, Krst. (*Pichiragua* or *Perichagua* in the island of Margarita; *Marie Pompun* in Curazao). Not uncommon.

44. *Capraria mexicana*, Moric. (*Fregosa*, in Curazao *Tanchi*.) The same species grows also in the island of Margarita, but not in the neighbourhood of Caracas, where it is represented by *C. biflora*.

45. *Solanum aculeatissimum*, Jacq. One single specimen was collected in the centre of the island.

46. *Tournefortia volubilis*, L. Rare.
47. *Heliotropium hispidum*, Kth.
48. *H. inundatum*, Sw. Both very common in the depressions of the soil which are due to the old salt-ponds.
49. *H. curassavicum*, L. (*Cocolodé* in Curazao). On rocks near the coast.
50. *Lippia micromera*, Sch. (*Orégano*). Common.
51. *Avicennia nitida*, Jacq.
52. *A. tomentosa*, Jacq. Both pretty common.
53. *Ruppia maritima*, L. This plant was only once found, on a very shallow sand in the little bay called *Carenero*, on the eastern part of the south coast. The specimens were in fruit, with three carpels, podocarps twice as long as the fruits, their basal part somewhat spirally twisted.
54. *Thalassia testudinum*, Koen. Exceedingly common off the north coast, where it forms large submarine meadows, during the night the feeding-ground of great numbers of turtles. The specimens had neither flowers nor fruit. (One of my pupils, Mr. G. Lessmann, a young pharmaceutist, sent me a great many ripe fruits of this plant, which he had collected in September, last year, off Cabo Blanco, to the west of La Guayra.)
55. *Sporobolus virginicus*, Kunth. Common.
56. *Cenchrus echinatus*, L.
57. *Cenchrus tribuloides*, L.
58. *Panicum adscendens*, H.B.K. (?)
59. *Setaria disticha*, Kth.
60. *Aristida stricta*, Michx. (?)
61. *Vilfa humifusa*, Kth. All very common.
62. *Cyperus brunneus*, L. Very common on the beach.
63. *Opegrapha, spec.* On dry branches.
64. *Pertusaria dealbatus*, Ach. On limestone.
65. *Usnea florida*. DC. On branches.
66. *Roccella tinctoria*, Agh. Sparingly on rocks.
67. *R. fuciformis*, Ach. On the branches of different woody plants in the neighbourhood of the sea.
68. *Ramalina calicaris*, Ach.
69. *R. scopulorum*, *β. tortuosa*, Ach. Both on branches of *Mauria heterophylla*.

It will be seen from this enumeration that the Flora of Tortuga has been totally derived from the neighbouring coast, seeds having been transported by currents or by birds.

Caracas, January 15, 1876.

CISSUS HAHNIANUS, *sp. nova*, FROM VENEZUELA.

By Dr. A. Ernst.

Scandens, *caulibus ramisque* teretibus glabris griseis nodis incrassatis; *foliis* petiolatis simplicibus cordato-orbiculatis quintuplinerviis pinnatipartitis (superioribus minoribus tripartitis vel sub integris), segmentis quinque infimis oblique bilobatis summo tripartito, omnibus margine remote et argute serratis serraturis minimis adpressis, sinubus obtusis superioribus clausis vel subclausis, foliis supra saturate viridibus lucidis subter pallidioribus pilosulis vel subglabris pilis brevibus adpressis; *stipulis* angustissimis falcatis fugacibus; *cymis* terminalibus et oppositifoliis 5-radiatis pulcherrime rubris et pilis brevibus albis notatis, radiis apice bifidis; *floribus* umbellulatis pedicellatis pedicellis floribus æqualibus, calycibus subtruncatis, petalis obtusis caducissimis, disco continuo 4-sulcato, filamentis 4 sulcis disci adpressis, antheris flavis connectivo rubro, stylo viridi; fructu magnitudine pisi nigro monospermo.

Petiolus foliorum 9-10 centimetralis, limbus 15 centim. longus ad 20 latus, cymi 4 centim. in diametro, flores 3 mm. longi.

This handsome species, which I believe to be new to science, was found in the woods near Mariara, on the Lake of Valencia, whence Ch. Hahn, Esq., Consul of New Granada, Caracas, obtained the specimen he cultivates in his lovely garden *El Paraiso*, to whom I dedicate the species as an acknowledgment of the great service he has done to Venezuelan horticulture by the introduction and cultivation of a great number of valuable and beautiful plants.

Caracas, *January* 15th, 1876.

A CASE OF FASCIATION IN FOURCROYA CUBENSIS, *Haw.*

By Dr. A. Ernst.

The *Museo Nacional* of Caracas received lately a very interesting fasciated inflorescence of this plant, in which all the axes have coalesced, forming a large, somewhat twisted board, 2 metres high, 1·33 m. broad (allowance made for the curvatures), and from 1 decim. to 8 millim. thick. It was discovered on the coffee estate, Montalban, near Caracas, and offered to the Museum by Mr. M. Escobar, a merchant of that city.

I think this object of interest, as most probably the largest case of fasciation on record, the plant besides not being included in the list given by Dr. Masters in his "Teratology" (pp. 20, 21). I have observed fasciation also in the following plants, likewise missing from Dr. Masters' list: *Stachytarpha jamaicensis* (very common), *Achras Sapota*, *Jasminum Sambac*, *Croton urticifolius*.

I should think this formation is not always the result of a fusion of several axes. In *Stachytarpha jamaicensis*, for instance, the normal inflorescence is an elongated, thread-like spike, bearing the flowers in furrows of the rachis. In the fasciated inflorescence the basal part is quite as narrow, but it enlarges gradually, measuring sometimes more than an inch across its top, and forming a leaf-like, spathulate body, densely covered on both sides by numerous flowers. As there is normally but one rachis or axis, the fasciation cannot be, I should think, a fusion of several axes, and I would rather prefer, in this case, Moquin Tandon's explanation. The same I believe to be the case with fasciated branches of *Achras Sapota*. They enlarge gradually, bearing at the end a dense tuft of leaves.

ON NEW BULBOUS PLANTS FROM THE EASTERN PROVINCES OF CAPE COLONY.

By J. G. Baker.

The following interesting novelties are all contained in a parcel just received from Mr. MacOwan, and were collected partly by himself in Somerset East, and the rest by the Rev. R. Baur near the Baziya mission station, in the interior of Transkeian Kaffraria, a tract of the botany of which we know very little, and which may be expected to yield a rich harvest.

Order Hypoxidaceæ.

Hypoxis Baurii, *Baker.*—Cormus oblongus, verisimiliter annuus, 3-4 lin. crassus, tunicis apice copiose setosis. Folia 5-6, linearia, erecta, 1½-2 poll. longa, 1½-2 lin. lata, rigidula, subcoriacea, acuta, distincte costata, ubique pilis setosis albidis patulis ½-1 lin. longis vestita. Pedunculi ad rosulam 2, uniflori, erecti, graciles, foliis æquilongi, pilis consimilibus vestiti, bracteis 1-2 minutis inconspicuis præditi. Ovarium clavatum, 2 lin. longum, setis ascendentibus albidis densissime vestitum. Perianthii limbus saturate ruber, 5-6 lin. longus, segmentis conformibus dorso nudis obovatis vel oblanceolatis obtusis 2-4 lin. latis. Stamina perparva, ½ lin. longa (an rite evoluta?), antheris oblongis, filamentis brevissimis. Capsula supra basin circumscissa. *Kaffraria Transkeiana superior ad Montes Baziya, alt.* 3500-4000 *pedes.* Floret Oct.-Nov.; Baur., 501! Differs from all the Hypoxidaceæ already known by its bright red flowers.

Hypoxis biflora, *Baker.*— Cormus ovoideus, perennis, 3-4 lin. crassus, tunicis nigricantibus, apice haud setosis. Folia 5-6, linearia, falcata, canaliculata, suberecta, 3-4 poll. longa, deorsum 1½-2 lin. lata, ad apicem attenuata, subcoriacea, pilis paucis adpressis inconspicuis prædita. Pedunculi ad rosulam 2-3, 1-2 poll. longi, gracillimi, laxe biflori, pilis consimilibus paucis adpressis præditi. Pedicelli erecto-patentes, 6-18 lin. longi, adpresse sericei, basi bracteis parvis linearibus sericeis 3-4 lin. longis vestiti. Ovarium turbinatum, 1½ lin. longum, pilis sericeis adpressis albidis dense vestiti. Perianthii limbus 3-4 lin. longus, segmentis oblongis vel lanceolatis 1-1½ lin. latis, facie luteis, dorso ubique subtiliter sericeis. Stamina limbo duplo breviora, antheris lanceolatis sagittatis leviter versatilibus. Stylus simplex, limbo 3-4-plo brevior. *Kaffraria Transkeiana superior in udis et ad ripas fluviorum, alt.* 2500 *pedes.* Floret Nov.; Baur, 347! Near *H. angustifolia*, Lam., of Mauritius and Zanzibar. Received previously from the *Orange River Free State*; Cooper, 1039!

Hypoxis Ludwigii, *Baker.*—Cormus perennis, 1 poll. crassus. Folia 6-8, suberecta, linearia, subcoriacea, 12-15 poll. longa, supra basin 6-9 lin. lata, crebre multinervata, utrinque viridia, præsertim ad marginem et costam faciei inferioris pilis brevissimis setosis albidis prædita. Scapus ad rosulam unicus, flexuosus, 9-12-pollicaris, pilis setosis albidis laxis erecto-patentibus 1-1½ lin. longis ubique subdense vestitus. Flores 6-12, in corymbum laxum dispositi, pedicellis inferioribus 1-1½ poll. longis, bracteis linearibus ½-1 poll. longis. Ovarium obconicum, 3 lin. longum, pilis albidis ascendentibus dense vestitum. Perianthii limbus 6-8 lin. longus, segmentis oblongo-

lanceolatis, 2-3 lin. latis facie luteis, dense sericeo-villosis. Stamina limbo duplo breviora, antheris lanceolatis leviter versatilibus 1½ lin. longis. Stylus integer, staminibus æquilongus *Kaffraria Transkeiana superior ad Baziya, alt.* 2000 *pedes.* Floret Oct.-Nov.; Baur, 301! Most like *H obtusa*, Burchell in Bot. Reg, t. 159, but different in leaf-nervation and in its corymbose inflorescence and larger flowers. I have had it described in manuscript for some time, from notes taken on a specimen in the herbarium of Trinity College, Dublin, dried by Dr. Harvey, from the garden of Baron Ludwig at Cape Town.

Order IRIDACEÆ.

GLADIOLUS LONGICOLLIS, *Baker.*—Bulbus globosus, 8-9 lin. crassus, tunicis brunneis copiose fibrosis. Folia basalia tempore florationis nulla; unicum 2-3 poll. supra basin productum, subteres, falcatum, 6-12 poll. longum, ¾-1 lin. latum, glabrum, facie profunde canaliculatum, firmum. Caulis ½-1-pedalis, gracilis, teres, distincte multisulcatus, apice laxe 1-2-florus, foliis 2 parvis supra medium bracteatus. Spathæ valvæ virides, lanceolatæ, subpollicares. Perianthium 3 lin. longum, tubo sæpissime curvato ex spatha longo exserto, limbo sulphureo purpureo tincto et punctis minutis decorato, raro rubello, segmentis subæqualibus late oblongis acutis, 9-10 lin. longis, 4-5 lin. latis. Stamina limbo duplo breviora, antheris sulphureis 3-4 lin. longis. *Kaffraria Transkeiana superior ad Montes Baziya, alt.* 3000-4000 *pedes;* Baur, 505! Floret Oct.-Nov. Nearest *G. versicolor*, Andr. Bot. Rep., t. 19, but distinguishable at a glance from anything already known in the *tristis* group of Gladioli (genus *Ranisia,* Salisb.) by its perianth-tube being twice as long as the spathe.

GLADIOLUS OCHROLEUCUS, *Baker.*—Bulbus globosus, 9-12 lin. crassus, tunicis membranaceis brunneis apice setosis. Folia basalia 4-6, ensiformia, rigide subcoriacea, acuta, glabra, 6-9 poll. longa, medio 5-6 lin. lata, venis crassis distinctis 6-10, costa et marginibus stramineis valde incrassatis. Scapus 1½-2-pedalis, foliis 3-4 reductis præditus. Scapus laxus, secundus, 6-8-pollicaris. Spathæ valvæ membranaceæ virides, oblongo-lanceolatæ, acutæ, 12-18 lin. longæ. Perianthii tubus 10-12 lin. longus, curvatus, apice cite ampliatus; limbus diutine infundibularis, 1 poll. longus, ochroleucus, immaculatus, segmentis superioribus obovatis obtusis 5-6 lin. latis, inferioribus brevioribus angustioribus distincte unguiculatis. Stamina limbo paulo breviora, antheris pallidis acutis 4 lin.! longis. *In graminosis clivis Montis Baziyæ, alt.* 2000 *pedes*; Baur, 94. Floret Dec. ad Mart. Of previously-described species, nearest *G. Papilio*, Hook. fil. in Bot. Mag., tab. 5565, which has lilac flowers, with a large obovate red blotch, with a yellow border at the throat of the three lower segments.

HESPERANTHA BAURII, *Baker.*—Bulbus globosus, 3-4 lin. crassus, tunicis rigidulis chartaceis castaneis. Folia subbasalia 2, linearia, firmula, glabra, graminoidea, semipedalia, 1½ lin. lata, plana, distincte costata. Caulis pedalis, foliis 2 suprabasalibus longe amplexicaulibus limbo libero brevi lineari præditus. Spica laxa, 5-10 flora, æquilateralis, 3-5 poll. longa. Spathæ valva exterior 6-8 lin. longa, firmula, viridula, complicata, apice rubella. Perianthium erecto-patens, 14-15 lin. longum, tubo 6-8 lin. longo, segmentis saturate rubris oblongis, medio 2-3 lin. latis, flore expanso erecto-patentibus. Stamina perianthio distincte breviora, antheris anguste ligulatis 3 lin. longis. *Kaffraria Transkeiana superior ad Montes Baziya, alt.* 2500-3000 *pedes*; Baur, 628! Floret Martio. A very handsome and very distinct new species, allied to *H. falcata*, Ker. (Bot. Mag., tab. 566).

HESPERANTHA BULBIFERA, *Baker*.—Bulbum non vidi. Folia subbasalia 2-3, linearia, glabra, graminoidea, pedalia vel sesquipedalia, 3-4 lin. lata, in axillis sæpe bulbifera. Scapus sesquipedalia, teres, debilis, foliis 3-4 consimilibus minoribus, in axillis sæpe bulbiferis, præditus. Spica laxe 2-3-flora. Spathæ valvæ 8-9 lin. longæ, pallidæ, membranaceæ, obtusæ. Perianthium album, 15 lin. longum, tubo curvato 3-4 lin. longo, segmentis oblongis medio 3-4 lin. latis, limbo diutine infundibulari. Stamina limbo ⅓ breviora, antheris ochroleucis 5 lin. longis. *In rimis scopulorum ad cataractas Montis Boschberg*; MacOwan, 2215! "Bulbilli a cynocephalis (Cebus capensis) pro cibo evelluntur avide." Belongs to the small group with a much curved perianth-tube, of which *H. radiata*, Ker (Bot. Mag., t. 573) is the best-known representative.

Order AMARYLLIDACEÆ.

CYRTANTHUS (MONELLA) TUCKII, *Baker*.—Bulbum non vidi. Folia synanthia, anguste lorata, carnoso-herbacea, glabra, pedalia vel sesquipedalia, 3-4 lin. lata. Scapus pedalis et ultra, 3-4 lin. crassus. Valvæ spathæ 2, lanceolatæ, membranaceæ, virides, obtusæ, 3-3½ poll. longæ. Umbellæ 12-15-floræ, pedicellis ascendentibus ½-2½ poll. longis. Perianthium 1½-2¼ poll. longum, ovario parvo oblongo, limbo saturate coccineo, deorsum siccatione flavidulo, tubo clavato 15-21 longo, e basi ½ lin. ad oram 3-4 lin. crassam sensim ampliato, segmentis oblongis obtusis apice calloso-cuspidatis, 3-4 lin. longis, diutine ascendentibus. Stamina e tubo haud exserta, antheris oblongis 1½ lin. longis. Stylus limbo subæquilongus, apice distincte tricuspidatus. *In graminosis clivis summi Montis Boschberg, alt.* 4500 *pedes*; MacOwan, 2133! *Kaffraria Transkeiana superior ad Baziya, alt.* 2000 *pedes;* Baur, 523! Floret Sept.-Dec. Named, at Mr. MacOwan's request, after Mr. William Tuck, formerly of the Grahamstown Botanic Garden, now overseer of the municipal lands at Somerset East. Closely allied to *C. angustifolius*, Ait., Bot. Mag., t. 571, but with a different spathe and the segments of the limb different in shape and much smaller.

Order LILIACEÆ.

SCILLA (LEDEBOURIA) PUSILLA, *Baker*.—Bulbus magnus, oblongus, 8-9 lin. crassus, fibris basalibus copiosis, tunicis multis truncatis atrobrunneis. Folia 5-6-synanthia, rosulata, ovato-lanceolata, glabra, carnoso-herbacea, 1½-2, poll. longa, 5-6 lin. lata, basi vix angustata. Scapus flexuosus, 1-1½ pollicaris. Racemus expansus densus oblongo-conicus, 1-1½ poll. longus, 5-6 lin. latus, pedicellis inferioribus cernuis 1-1½ lin. longis, bracteis minutissimis deltoideis. Perianthium campanulatum, saturate purpureum, 1½ lin. longum et latum. Stamina perianthio vix breviora, filamentis splendide purpureis. Ovarium sessile, globosum. *Kaffraria Transkeiana superior ad Montes Baziya*,

alt. 2000 *pedes;* Baur, 293! Floret Oct. Closely allied to *Scilla prasina*, Baker in Journ. Linn. Soc. xiii., 248.

MASSONIA VERSICOLOR, *Baker*.—Bulbus globosus, 7-8 lin. crassus, tunicis membranaceis pallide brunneis. Folia 2, patula, rotunda, glabra, carnoso-coriacea, 1½-2 poll. longa et lata, subobtusa. Umbella densa, hemisphærica, in axillis foliorum sessilis, 20-40-flora. Bracteæ exteriores oblongo-spathulatæ, 5-6 lin. longæ, membranaceæ, viridulæ vel interdum rubellæ. Pedicelli 1½-3 lin. longi. Perianthium album, 4-5 lin. longum, segmentis lanceolatis flore expanso patulis, tubo cylindrico duplo brevioribus. Stamina 3 lin. longa, erecto-patentia, filamentis crassis subulatis, antheris parvis oblongis cæruleis. *C. B. S. in argillaceis apricis fluminis Klyn Visch rivier, alt.* 2500 *pedes;* MacOwan, 2178! Floret Oct. Of described species only near *M. Huttoni*, Baker in Journ. Linn. Soc. xi., 390, from which it differs in the shape of the leaves and its much smaller flowers.

BULBINE PALLIDA, *Baker*.—Acaulis, cormo lignoso obliquo cylindrico, apice haud setifero. Folia plura, rosulata, erecta, subteretia, glabra, 3-4 poll. longa, vix 1 lin. lata. Scapus strictus, fragilis, teres, gracilis, semipedalis. Racemus laxus, 10-12-florus, oblongus, expansus 2 poll. longus, 1 poll. crassus, pedicellis erecto-patentibus, defloratis cernuis, inferioribus 3-4 lin. longis. Bracteæ deltoideæ, fimbriatæ, insigniter cuspidatæ, 1½-3 lin. longæ. Perianthium albidum, 3 lin. longum, segmentis oblongis flore expanso reflexis, nervo unico centrali viridulo præditis. Stamina perianthio duplo breviora, filamentis luteo-stupposis. Stylus declinatus, 2 lin. longus. *Kaffraria Transkeiana superior ad Tabase, ad latera montium, alt.* 2500 *pedes;* Baur, 417! Floret Nov. Nearest *B. asphodeloides*, R. & S. (Jacq. Vind., t. 181.)·

ON *CHLAMYDOSTYLUS*, A NEW GENUS OF IRIDACEÆ FROM TROPICAL AMERICA, AND ITS ALLIES.

BY J. G. BAKER.

THE *Iridaceæ* of Tropical and Warm Temperate America are difficult plants to deal with on account of the very fugacious character of the flowers of many of the genera. They fall into two great groups, one *Sisyrinchium*-like, with a regular perianth, and the other *Iris*-like, with the outer and inner segments of the perianth decidedly dissimilar and stigmas usually petaloid. Of the regular-flowered series *Sisyrinchium* is marked off from the rest by its fibrous roots. There are three other genera with regular flowers already published, *Nemastylis* of Nuttall, and *Gelasine* and *Calydorea* of Herbert, and to these I wish now to add a fourth, which I propose to call *Chlamydostylus*.

All these four are closely allied to one another. They coincide in their *Sisyrinchium*-like regular perianths; in their fugitive, mostly blue flowers, produced one after another from a spathe of more than two valves, on pedicels which when the flowers are ready to expand reach up to the top of the spathe-valves; in the entire absence of any perianth-tube above the ovary; in their fragile, terete, sparingly leafy stems; in their narrow, dry, plicate leaves; and in their operculate, clavate, membranous capsules. They differ principally in their stamens and styles, and this, according to the classification of the Order generally received, places them far apart in the sequence of genera, *Gelasine* and *Chlamydostylus* being monadelphous, whilst in *Calydorea* and *Nemastylis* the filaments are free, *Chlamydostylus* has exactly the remarkable style-structure of *Nemastylis*, six subulate forks spreading like the spokes of a wheel, whilst in *Calydorea* and *Gelasine* the three styles are either entire, or at most only emarginate at the tip; so that *Chlamydostylus*, referring to old types, may be briefly stated to be a genus of bulbous *Sisyrinchium*-like *Iridaceæ*, with the stamens of *Gelasine* and pistil of *Nemastylis*.

The following is a description of the genus, and of the species which I have had an opportunity of examining:—

CHLAMYDOSTYLUS, *Baker*.—Perianthium regulare cæruleum tenerum, tubo supra ovarium nullo, limbo campanulato, segmentis æqualibus obovatis obtusis. Stamina inclusa monadelpha, filamentis in columnam cylindricam prorsus connatis, antheris 3 basifixis erecto-patentibus, ligulatis connectivo angusto, vel oblongis, connectivo lato. Ovarium clavatum, triloculare, ovulis in loculo crebris horizontalibus; stylus filiformis erectus, ramis 6 subulatis apice stigmatosis. Capsula clavata, membranacea, operculata. Semina perfecte matura non vidi. Herbæ bulbosæ Americæ tropicalis, foliis 1-2 basalibus teretibus vel anguste linearibus plicatis, caulibus simplicibus vel parce ramosis 1-2- foliatis, spathis segregatis terminalibus 1-6-floris, valvis lanceolatis viridulis arcte imbricatis, pedicellis floriferis sæpissime protrusis.

Clavis specierum.

Antheræ ligulatæ, connectivo angusto inconspicuo.
Semipedalis, foliis angustissimis subteretibus, floribus ad spatham 1-2 . . . . 1. *C. tenuis.*
Pedalis, foliis anguste linearibus plicatis, floribus ad spatham 4-6 . . . . . 2. *C. multiflorus.*
Antheræ oblongæ vel subpanduriformes, connectivo lato conspicuo.
Folia anguste linearia plicata. Pedicelli e spatha protrusi cernui . . . . 3. *C. cernuus.*
Folia dura teretia. Pedicelli inclusi . . . 4. *C. Medusa.*

1. C. TENUIS, *Baker*.—Nemastylis cœlestina, var. tenuifolia, *Herb. in Bot. Mag.*, sub t. 3779; Beatonia cœlestina, *Klatt in Linnæa* 31, 567, *ex parte*. Bulbus ovoideus 4-5 lin. crassus, tunicis fusco-nigris secus collum longe productis. Folia basalia 2, erecta, filiformia, 4-6 poll. longa, ⅓-½ lin. lata, albido-vittata. Caulis semipedalis, gracillimus, simplex vel furcatus, folio unico reducto supra medium præditus. Spathæ valvæ lineares vel lanceolatæ, acutæ, 9-12 lin. longæ. Flores erecti, sæpissime solitarii, pedicellis 9-12 lin. longis. Ovarium clavatum, glabrum, 2 lin. longum. Perianthium cæruleum, 6-8 lin. longum, segmentis obovato-oblongis 3 lin. latis. Columna filamentorum alba, cylindrica, 1 lin. longa, antheris ligulatis luteis flore expanso convolutis, connectivo angusto. Stylus columna æquilongus, ramis subulatis erecto-patentibus 2 lin. longis. *Mexico ad Aguas Calientes*, Hartweg, 229!; *Monterey*, Dr. Edwards! (Torrey in Hb. Benth.); *Santa Fé prope urbem Mexico*, Bourgeau, 416!

2. C. MULTIFLORUS, *Baker*.—Bulbus ovoideus 5-6 lin crassus, membranaceo-tunicatus. Folium basale unicum, lineare, ultra pedale, 3 lin. latum, glabrum, plicatum. Caulis subpedalis, gracilis, fragilis, teres, flexuosus, simplex vel profunde furcatus, foliis 1-2 magnis præditus, ramis 1-2 distantibus brevibus arcuato-ascendentibus. Spathæ 3-6-floræ, valvis lanceolatis viridulis 18-24 lin. longis, pedicellis floriferis erectis valvis æquilongis. Ovarium clavatum, 2 lin. longum. Perianthii limbus saturate cæruleus, segmentis obovatis obtusis 8-9 lin. longis, 3-4 lin. latis. Columna filamentorum cylindrica, 4 lin. longa, antheris flavis ligulatis erecto-patentibus 3 lin. longis. Styli rami gracillimi ascendentes, antheras paulo longiores. *Mexico ad Zimapan*, Dr. Coulter, 1536! (ex herb. Trin. Coll., Dublin); *Andes ad Huanaco, alt.* 10,000 *pedes*, Pearce!

3. C. CERNUA, *Baker*.—Bulbum et folia radicalia non vidi. Caulis simplex, subpedalis, folio unico anguste lineari semipedali $1\frac{1}{2}$ lin. lato prope basin præditus. Spatha solitaria, terminalis, biflora, valvis lanceolatis acuminatis viridulis subæquilongis 22-24 lin. longis. Pedicelli floriferi cernui, 2 poll. longi. Ovarium glabrum, obconicum, $1\frac{1}{2}$-2 lin. longum. Perianthii limbus campanulatus, saturate cæruleus, segmentis obovatis obtusis valde imbricatis 10-12 lin. longis, 5-6 lin. latis. Columna filamentorum cylindrica, 2 lin. longa, antheris oblongis $1\frac{1}{2}$ lin. longis, connectivo lato. Styli rami ascendentes, antheras distincte longiores. *Guatemala*, Salvin and Godman, anno 1861!

3. C. MEDUSA, *Baker*.—Bulbum non vidi. Folium radicale durum, teres, flexuosum, pedale, et ultra, $\frac{1}{2}$-$\frac{3}{4}$ lin. crassum. Caulis simplex, semipedalis, flexuosus, foliis 2 supra medium præditus, unico elongato, tereti, altero parvo lineari. Spathæ valvæ duræ, inæquales, lanceolatæ, late naviculares, acutæ, viridulæ, exterior 2-$2\frac{1}{2}$ poll. longa. Pedicelli erecti, spatha valde breviores. Perianthium saturate cæruleum, segmentis obovatis, 15-18 lin. longis, 9-10 lin. latis. Columna filamentorum brevissima, antheris erecto-patentibus, 3 lin. longis, connectivo lato. Styli pars simplex 4 lin. longus, ramis subulatis patulis 3 lin. longis. *Brasilia centralis in locis glareosis montis Serra de Natividade*, Gardner, 4005!

The following are the species of the three allied genera and their countries, so far as I am acquainted with them:—

NEMASTYLIS, *Nuttall* in Amer. Phil. Trans., new series, vol. v., p. 157 (1834)—Filaments free; style-arms six.

1. N. CŒLESTINA, *Nuttall, loc. cit.*—Ixia cœlestina, *Bartram Iter*, p. 152, t. 3.—Marica cœlestina, *Ker, Gen. Irid.*, 19.—Beatonia cœlestina, *Klatt in Linnæa* 31, p. 567.—*Florida to Carolina and westward.*

2. N. ACUTA, *Herb. in Bot. Mag.*, sub t. 3779; *Engel. and Gray Pl. Lindh.*, p. 27.—Ixia acuta, *Barton, Flor. N. Amer.* i., p. 76.—N. geminiflora, *Nuttall loc. cit.; Klatt in Linnæa* 31, p. 559.—*Arkansas and Texas.* Introduced lately into English gardens. I have received it from both Mr. Bull and Mr. Green, of Reigate.

3. N. PURPUREA, *Herb. in Bot. Mag.*, sub t. 3779.—Eustylus purpurea, *Engel. and Gray in Pl. Lindh.*, p. 27.—*Texas*, Drummond, ii., 260! iii., 413! Lindheimer, 189! *Western Louisiana*, Dr. Hale in Herb. Carey! *Eustylus* of Engelmann and Gray differs from *Nema-*

stylis proper by its broad connective, just as *Chlamydostylus Medusa* and *cernua* differ from *tenuis* and *multiflorus*. Dr. Klatt in Linnæa xxxv., 383, has referred both this and *Gelasine texana*, Herb., to *Alophia Drummondiana*, but after examining Herbert's type specimens of the three I am prepared to confidently endorse his view that they belong to three different genera, *Alophia* being a neighbour of *Cypella*.

4. N. TRIFLORA, *Herb. in Pl. Hartweg*, p. 95.—*Mexico*, Hartweg, 625. I have not seen this, and as Herbert in his description does not expressly say whether the filaments are united or free it may prove a *Chlamydostylus*.

GELASINE, *Herb. in Bot. Mag.*, tab. 3779.—Filaments monadelphous; style-arms simple.

1. G. AZUREA, *Herb. loc. cit.*—*Banda Oriental and banks of the Rio Grande*, Tweedie, 703.! Not identical with *Roterbe gracilis* of Klatt, as stated in "Fl. Bras.," vol. 3, p. 5 4.

2. G. GRANDIFLORA, *Herb. in Bot. Mag.*, sub t. 3779.—*Andes of Pichincha*, 7000-9000 feet! Jameson! Hall! *Banos in declivibus secus fl. Pastasa*, Spruce, 5063.

3. G.? PURRUCHUCANA, *Herb. loc. cit.*—*Andes of Purruchuca*, Matthews, 784! Requires re-examination upon better specimens.

Herbert's *G. nuda* and *texana* both belong to the next genus.

CALYDOREA, *Herb. in Bot. Reg.*, 1843, *Misc.*, p. 85.—Botherbe, "*Steud.*," *Klatt in Linnæa*, 531-562.—Roterbe, *Klatt in Fl. Bras.* iii., p. 543, tab. 91, fig. 4, *not Steud.* Filaments free; style-arms simple or emarginate at the tip. This is the largest genus of the four. Dr. Klatt has fully described several of the species under the generic name of *Botherbe* or *Roterbe*, but he has overlooked Herbert's genus, characterised in 1843, and besides this the two plants distributed by Steudel in Lechler's collection under the name *Roterbe* have neither of them anything to do with the plants with which we are now dealing, for one is a *Herbertia* and the other a *Libertia*.

Clavis specierum.

Cæruleæ, styli ramis elongatis.
1. *C. speciosa*. 2. *C. campestris*. 3. *C. Gardneri*. 4. *C. texana*.
Luteæ, styli ramis elongatis.
5. *C. luteola*. 6. *C. furcata*.
Cæruleæ, styli ramis brevissimis.
7. *C. nuda*. 8. *C. punctata*.
Cærulea, stigmatibus more Gladioli explanatis obovato cuneatis.
9. *C. longispatha*.

1. C. SPECIOSA, *Herb. in Bot. Reg.*, 1843, *Misc.*, p. 85.—Sisyrinchium speciosum, *Hook. Bot. Mag.*, tab. 3544.—S. xiphioides, *Poppig. Frag. Syn.*, p. 4.—Botherbe bulbosa, *Klatt in Linnæa* 31, 563, *non Steudel.*—*Chili, on sandy hills near Valparaiso* Cuming, 498! Bridges 415! Macrae! Matthews, 308! Steudel's *Roterbe bulbosa* is *Herbertia pulchella* of Sweet, figured British Flower Garden, tab. 222, and Bot. Mag., tab 3862, figs. 1 and 2, which has monadelphous filaments and small oblanceolate acute inner segments of the perianth.

2. C. CAMPESTRIS, *Baker.*—Botherbe campestris, *Klatt in Linnæa*

31, p. 563.—Roterbe campestris, *Klatt in Fl. Bras.*, 3, p. 543!—*Brasilia meridionalis*, Sello! Weir, 359! *Monte Video*, Gibert, 181.

3. C. GARDNERI, *Baker*.—Bulbus ovoideus, 6-9 lin. crassus, tunicis multis membranaceis atro-castaneis, secus collum longe productis. Folia basalia 2-3, anguste linearia vel subteretia erecta, 6-12 poll. longa, ½-1 lin. lata, glabra, acuta. Caulis gracilis, teres, fragilis, vix pedalis, 1-2-furcatus, foliis 1-2 reductis linearibus præditus, ramis ascendentibus 1-3 poll. longis. Spathæ terminales 2-3-floræ, valvis inæqualibus viridibus lanceolatis acutis complicatis, 9-15 lin. longis. Pedicelli erecti, spatha breviores. Ovarium turbinatum, 1 lin. longum. Perianthii limbus cæruleus, segmentis obovatis obtusis 6-8 lin. longus, 3-4 lin. latis. Antheræ ligulatæ. 2 lin. longæ, filamentis brevibus, connectivo angusto inconspicuo. Styli rami elongati, apice capitati. *Brasilia centralis in ditione Piauhy in locis arenosis ad Boa Esperanca*, Gardner, 2322! Flowers "pale blue; very pretty."

4. C. TEXANA, *Baker*.—Gelasine? texana, *Herb. in Bot. Mag.*, sub t. 3779.—*Texas ad Galveston Bay*, Drummond, iii., 415! in herb. Hooker. According to Engelmann and Gray in Pl. Lindh., p. 27, some of the specimens distributed under this number belong to *Nemastylis acuta*.

5. C. LUTEOLA, *Baker*.—Botherbe luteola, *Klatt in Linnæa* 31, p. 563.—Roterbe luteola, *Klatt in Fl. Bras.* iii., 544, tab. 71, fig. 4.—*Brasilia meridionalis*, Sello!.

6. C. FURCATA, *Baker*.—Nemostylis furcata, *Klatt in Linnæa* 31, p. 560; *Fl. Bras.* iii., p. 515, tab. 65.—*Monte Video*, Sello! This has the style-arms more distinctly bifid at the tip than in any of the other species.

7. C. NUDA, *Baker*.—Gelasine? nuda, *Herb. in Bot. Mag.*, sub t. 3779.—Botherbe gracilis, *Klatt in Linnæa* 31, p 565—Roterbe racilis, *Klatt in Fl. Bras.* iii. p. 544.—*Monte Video*, Tweedie! Sello! Fox, 442! Gibert. 564!

8. C. PUNCTATA, *Baker*.—Gelasine punctata, *Herb. in Bot. Mag.*, sub t. 3779.—*Mexico inter Tehuantepec et Mare pacificum in ditione Vaxacana*, Andrieux, 79!

9. C. LONGISPATHA, *Baker*.—Gelasine longispatha, *Herb. in Benth. Pl. Hartweg*, p. 53.—Botherbe longispatha, *Klatt in Linnæa* xxxi., 504.—*Mexico*, Hartweg, 503!

Differs from all the rest in its dilated complicate ciliated Gladiolus-like stigmas, and probably should be regarded as a new genus.

To some of these genera also probably belong the following numbers, of which I have not been able to see specimens in which I could make out the structure of the flower, viz.:

Gardner, 2321, from the province of Piauhy.

Gardner, 2320, from Oeiras; "flowers large, yellowish-white."

Blanchet, 2741, from Utinga, in the province of Bahia.

Notices of Books.

Medicinal Plants, being Descriptions with Original Figures of the Principal Plants employed in Medicine, and an account of their Properties and Uses. By ROBERT BENTLEY, F.L.S., and HENRY TRIMEN, M.B., F.L.S. Parts 1—8. London: Churchill, 1875-6. Royal 8vo.

EIGHT monthly parts, containing sixty plants, have already appeared of this publication, which consists of original coloured illustrations, with accompanying descriptive text, of the plants which yield the drugs in common use. Whenever possible, the figures have been drawn from living specimens; this course, while considerably enhancing the value of the work as an original contribution to science, has caused the plates to be published without strict regard to their final arrangement, inasmuch as it is not always practicable to obtain a given living species in the state wanted for illustration; but all the plates and the accompanying text are plainly numbered in accordance with their proper place in the customary sequence of Natural Orders, so that when the work is finished it will be perfectly easy for the binder to set the arrangement right. In the cases where living specimens could not be obtained for illustration, the British Museum has supplied specimens from the Herbarium.

With each plate a detailed botanical description, which certainly does not generally err on the side of brevity or meagreness, is given, followed by an adequate and often very full discussion of the pharmaceutical names, composition, properties, and uses. It has not been thought necessary to give a description of the genera to which the species severally belong, but references are given to books where such information can be found. The drawings have been made, natural size, by Mr. D. Blair, F.L.S., and the usually enlarged dissections, though sometimes rather black, give them a distinct botanical value. Art critics will perhaps notice in the rendering of some of the plates a perceptible hardness and stiffness of outline which strongly savour of the herbarium rather than suggest nature; but more extended experience will doubtless enable the artist to overcome this difficulty with greater and more general success.

With regard to the execution of the work from a botanical point of view, the authors are to be generally commended for the care that they have evidently taken in selecting and citing with dates and synonymy the botanical names used by them, after the best manner of modern writers; additional figures of the species (when they exist) are also quoted. Two species, *Stillingia sylvatica*, Linn., and *Dorema Aucheri*, Boiss., are here figured for the first time.

On a critical examination of the formal particulars of nomenclature, a few, mostly unimportant, remarks can be made which may perhaps tend to prevent the possibility of the like criticism applying to the forthcoming parts of the work. The name of *Lobelia inflata* is ascribed to Linnæus, as if published by him in the "Acta Societatis Regiæ Scientiarum Upsaliensis ad annum mdccxli." (Stockh., 1746); the fact is that Linnæus in the above paper, pages 23-26, published this plant under the phrase of "LOBELIA caule erecto, foliis ovatis subserratis pedunculo longioribus, capsulis inflatis," and added a figure (tab. i.) representing the plant in two parts, natural size, with detached lettered figures showing the flower as seen both from above and from below, as well as a transverse section of the pericarp; it was not until the year 1753 that Linnæus in the first edition of the "Species Plantarum," page 931, named the plant *Lobelia inflata*. Another inaccuracy of the same kind occurs in referring the name of *Cinnamomum zeylanicum* to J. Breynius in a work that was published in the year 1676, long before the introduction of the binomial system of nomenclature; in the work referred to, Breynius called the plant by the short phrase of "*arbor Canella zeilanica*." However, our authors in this case prudently quote Breynius only on the authority of Hayne, and have simply followed other writers in thus referring the name, which properly belongs to Blume, Bijdr. Fl. Ned. Ind., p. 568 (1825).

It seems remarkable that so well and long known a species as the cultivated Mustard should bear a name (*Brassica alba*) which is dated so recently as 1872; it could at least have been ascribed to Boiss. ex Benth. Handb. Brit. Fl., p. 92 (1858).

The name of *Uncaria Gambier*, Roxb., was first published in the catalogue dated 1813 and appended to the "Hortus Bengalensis" (1814), without description, and subsequently with description in Carey's edition of the "Flora Indica" (1824), though our authors only quote the edition of the year 1832.

The Linnean names of *Iris florentina* and *Illicium anisatum* are referred to the second edition of the "Species Plantarum" (2), instead of the earlier work, namely, the tenth edition of the "Systema" (1759). On the other hand, the generic name of *Hagenia*, Gmelin, and the specific name of *H. abyssinica*, Willd., are rightly taken up in preference to the names of Kunth, *Brayera* and *B. anthelmintica*.

Besides the plants that are included in the official pharmacopœias of the present day, a few other plants possessing mild medicinal virtues are given by our authors; thus we find the China Tea-plant given under the name of *Camellia Thea*, Link., and the Assam Tea-plant (*C. theifera*, Griff.) is quoted as a synonym. The latter plant is, however, a well-marked variety, and in Hooker's "Flora of British India" is apparently regarded as a distinct species.

The succeeding parts of Bentley and Trimen's "Medicinal Plants," which will bring up the plates to over 300, will be looked forward to with much interest, and there can be no doubt or question as to the value and usefulness of the work. W. P. H.

Botanical News.

Articles in Journals.—April.

Bot. Zeitung.—T. Irmisch, "On the germinating plant of *Rhipsalis Cassytha* and its development" (contd.).—J. Weisner, "On the crystalline character of the waxy covering of plant-epidermis."—H. G. Holle, "On the growing-point of the roots of Angiosperms" (tab. 5).

Flora.—G. Winter, "Notes on the *Ustilagineæ*" (tab. 4-7).—C. Kraus, "Observations on hair-formation."—A. Geheeb, "Bryological notes from the Rhone Mountains" (contd.).—A. de Krempelhuber, "Lichenes Brasilienses" (contd.).—W. Velten, "Influence of temperature on protoplasm-movements" (tab. 8, 9).—J. Sachs, "On Reinke's 'Researches on growth.'" (contd.).

Œsterr. Bot. Zeitschr.—A. Kerner, "Botanical Notes."—F. v. Höhnel, "On the flora of Lower Austria."—V. de Borbás, "*Dianthus membranaceus*, n.sp."—J. Freyn, "On some Austro-Hungarian plants."—H. Schäfer, "The Isar-island, near Tolz."—F. Antoine, "Botany of the Vienna Exhibition" (contd.).

Hedwigia.—H. T. Bonorden, "Mycological descriptions."

Bot. Notiser.—J. E. Areschoug, "De Algis nonnullis maris Baltici et Bahusiensis."—C. Nordstedt, "On the employment of gelatine-glycerine in examining and preparing *Desmidiæ*."—A. Nathorst, "New plant-localities."

Nuov. Giorn. Bot. Ital. (30th April).—G. Gibelli, "On a singular structure in leaves of *Empetraceæ*" (tab. 5, 6).—T. Caruel, "Specific identity of *Ruscus Hypophyllum*, *R. Hypoglossum*, and *R. microglossus*." —A. Mori, "On the irritability of the leaves of *Aldrovanda vericulosa*."—G. Peruzzi, "Description of some fossil plants in the lignite of Casino." —C. Cugini, "On the nutrition of cellular plants."—F. Delpino, "Dichogamy and homogamy in plants."—P. Saccardo, "Fungi Veneti novi vel critici" (contd.).

New Books.—G. Bentham and J. D. Hooker, "Genera Plantarum." Vol. II., part 2, completing the *Gamopetalæ*. (Lovell Reeve, 32s.)—J. D. Hooker, "Flora of India." Part 4. (Lovell Reeve, 10s. 6d.)—C. Grenier (the late), "Revue de la Flore des Monts Jura," and Preface to "Flore de la Chaine Jurassique." (3s.)—H. Nordlinger, "Querschnitte von hundert Holzarten." Cent. VII. (Stuttgart, 14s.)—L. Just, "Botanischer Jahresbericht," 1874. 3rd and concluding part. (Berlin.)

Several (ten) of the contributions to the flora of France, published at different times from 1837 to 1874, by the late C. Grenier, have been collected together, and are on sale by Bailliere, price 4fr.

M. C. De Candolle has published an interesting paper in the Geneva "Archives des Sciences" for April on the structure and movements of the leaves of *Dionæa Muscipula*; with two plates. The spreading hairs are epidermal structures, but the excitant hairs are connected with the subepidermal tissue, and the author considers that the movements of the leaf-valves are due to variations in the turgescence of this parenchyma, to which stimuli are conveyed by the excitant hairs. He also shows that the absorption of material of animal origin is not utilised directly by the leaves, and is not necessary to the development of the plant.

We are indebted to the "Recorder" of the Botanical Locality Record Club (Mr. F. A. Lees) for a copy of the report for 1875, dated April 10. This extends to sixty-two pages, and, as in previous years, consists mainly of county records additional to those given in Watson's "Topographical Botany," without taking into account whether published already elsewhere or not. The special localities of some of the more interesting species are given in a separate list. *Trifolium maritimum* is recorded from the Isle of Wight, between Yarmouth and

Cowes; *Malaxis paludosa* from Greenfield, above Saddleworth, S.W York; and *Blysmus rufus* from N. Lincolnshire. County catalogues of common plants for Montgomery and Merionethshire, two of the counties for which no such lists were available for "Top. Botany," are communicated by the Rev. A. Ley. We are sorry to see that the southern Durham locality record for *Cypripedium* in a previous Report (which we reprinted at the time*) turns out to be a mistake. To avoid such errors the Club will in future do well to insist on their second rule (that a specimen of each plant wished to be recorded by members be sent) being in all cases strictly carried out.

The "Jardin Botanique de l'Etat" at Brussels has been provisionally placed under the charge of M. Crépin, consequent on the resignation of M. Dupont, the late director. MM. Cogniaux and Marchal, "aides-naturalistes" at the same establishment, will now take the title of conservators.

The Australian collections of Robert Brown will soon be accessible to botanists generally. This important series of specimens, in some respects the most interesting and valuable collection ever made by a botanical traveller, was, as is well known to most of our readers, formed by the celebrated R. Brown, in his capacity as naturalist during the voyage of H.M S. *Investigator*, commanded by Capt. Flinders, on the coast of New Holland and Van Diemen's Land, in the years 1802-5. The number of species is stated in Brown's "General remarks on the botany of Terra Australis" to amount to nearly 3900. On the death of Brown in 1858, his herbarium became by bequest the property of his friend and colleague, the late J. J. Bennett, and has been since accommodated in a room in the British Museum, access, however, to the specimens having been permitted by the owner to Mr. Bentham, author of the now nearly completed "Flora Australiensis," and to other working botanists. By Mr. Bennett's direction to his executrix, the officers of the British Museum Herbarium are now to select for that institution a complete series of the plants, after which a second set may be chosen in like manner from the remainder by the officers of the Royal Gardens at Kew, and finally a third set by the officers of the University Garden at Edinburgh.

The recently settled lawsuit in relation to Dr. Welwitsch's collections has an interesting bearing on this destination of Brown's plants. Both travellers were naturalists in the pay of their respective Governments, and the plants were collected during the course of their engagements; yet in the case of Brown the collection has been treated as private property for more than seventy years and twice bequeathed by will, whereas the claim of the Portuguese Government to the whole of Welwitsch's collections was strongly supported by the authorities at Kew. The trustees of the British Museum have gladly accepted the valuable gift now offered, since the Herbarium at present contains only the very incomplete set given by Brown to Sir Joseph Banks; but it will, we should suppose, be difficult for the authorities of Kew to consistently receive the plants of a Government expedition as a gift from a private individual without any recognition of the British Government whatever.

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* Journ. Bot., 1875, p. 50.

Original Articles.

ON *ANOMOCLADA*, A NEW GENUS OF HEPATICÆ, AND ON ITS ALLIED GENERA, *ODONTOSCHISMA* AND *ADELANTHUS*.

By Richard Spruce, Ph.D., F.R.G.S., &c.

(Tab. 178, 179.)

(*Continued from p.* 170.)

2. Odontoschisma denudatum (Mart.), Dum.—*Jungermannia scalaris β. denudata*, Mart. Fl. Crypt. Erlang., 183, t. 6, f. 586 (1817); *Pleuroschisma* (*Odontoschisma*) *denudatum*, Dum., Syll. Jung. Eur. 69 (1831); *Jungermannia Sphagni*, Hook. Brit. Jung., t. 33 (ex parte); *Sphagnoecetis communis β. macrior*, Nees in Syn. Hep., 149 (1845); *Odontoschisma denudatum* (Mart.), Lindberg, Not. Soc. F. Fl. Fenn., 1874, 359.

Hab.—Ad arborum excisarum prostratarumve truncos putrescentes, rarius in ipsa terra turfosa saxisque, vel supra muscos reptans, totius fere Europæ Americæque borealis, præcipue in montibus inferioribus; in Andibus rarissima (vide infra). In Pyrenæis valde abundat, præcipue ad pedem vallis *d'Ossau*, prope pagos Gélos et Jurançon.

Folia ·85 × ·8; cell. $\frac{1}{40}$; foliola sup. ·5 × ·4; bracteola int. ·9 × ·5; per 2·4 × ·5mm.

O. Sphagni, præcipue varietati *amazonicæ*, primo visu sat simile, paulo humilius, cæspitosum persæpe rubescens, colore magis in purpureum vel etiam in violaceum vergente (nec rubro-miniato sicut in *O. Sphagni*). *Caudex* breviusculus, prostratus aphyllus, totus *intricato-ramosus* radicellosus, insuperque flagellis validis radicellis villosissimis matrici adfixus. *Caules* vix pollicares *assurgentes* arcuantes, arhizi, *rarissime* apice flagelliformi radicantes, subramosi; *rami* sæpe fasciculati, *alii* (normales) *caulesque basi plus minus aphylli*, deinde foliis ad medium usque sensim crescentibus, apicem versus simili modo decrescentibus, vestiti, ex quo rami (*semper oligophylli*) *ambitu lineari-lanceolati evadunt; alii rami erecti superne sensim parvifolia apice gemmipari*.

Folia eadem fere forma ac *O. Sphagni*, oblique late ovata vel ovato-rotunda, raro retusa subemarginatave, antice obscure decurrentia, subconcava, assurgentia—non tamen secunda ad *O. Sphagni* instar—*pellucidiora*; *cellulæ* fere eadem magnitudine magis tamen incrassatæ, cavitate minore ambitu distincte 6-sinuata, endochromio parciore, externe parum verruculosæ. *Folia* surculorum gemmiparorum suberecta subrotunda, apice varia, rotundata, subacuta, erosave.

Foliola ubique fere obvia, ad caules minuta ovata squamæformia, *ad surculos gemmiparos insigniter aucta, superiora foliis adjectis æquimagna*—sæpe foliis caulinis mediis vix duplo minora—ovali-rotunda, subintegerrima.

Flores dioici, iis *O. Sphagni* parum diversi; *bracteæ* fl. ♀ intimæ foliis mediis æquilongæ, *apice recurvo-squarrosæ*, bifidæ, integerrimæ v. *denticulatæ*.

Perianthia foliis 3-plo longiora, anguste fusiformia trigona, pallida, sæpe infra medium purpureo-zonata, apice conniventi-clauso breviter fimbriata, demum *irregulariter rupta*, cellulis elongatis pachydermibus lævissimis conflata. *Calyptra* plus duplo brevior pyriformis tenuis, demum bilabiatim rupta, basi et perpaulo altius pistillidiis sterilibus circumdata. *Capsula* . . .

Amenta ♂ in planta propria, e caulis facie postica orta, albida tenera julacea, subrecta decurvave—nunquam circinnata; *bracteæ* pauci- vel sæpe multi- (ad 20-) jugæ, iis *O. Sphagni* sat similes.

Var. *andina*. Pulchre roseo-purpurea, sterilis. Cum planta Pyrenaica bene convenit, solum differt foliolis sæpe apice erosulis v. etiam bifidulis biciliatisve. Ad surculos gemmiparos assurgentes folia superiora sensim minora, foliolis subrotundis vix majora, iis plantæ nostratis accurate convenientia.

Hab. M. Campana Andium Peruvianorum, ad terram humidam sub Ericearum umbra, sociis *Jungermannia heteracria*, Spruce, et *Sphagno peruviano*, Mitt.—In Andibus nusquam alibi—in planitie Amazonica nullibi—inveni.

Odontoschisma denudatum was first distinguished by Martius in his excellent "Flora Cryptogamica Erlangensis" (1817)—not, however, as a species, but as a variety of *Jung. scalaris*, which it rather resembles in habit, in the round leaves and the conspicuous stipules; for the lateral inflorescence was not then (as now) esteemed of such importance as to separate even genera, although he was quite aware of its existence, as appears from his description, "*J. scalaris*, Schmid., *β. denudata* mihi. Caulibus elongatis filiformibus erectis, foliis minoribus, sursum decrescentibus, calycibus lateralibus" (op. cit., 183); and his figure (t. 6, f. 6), though rude, is characteristic. Nor did Nees at that epoch properly appreciate the lateral inflorescence, when, in the preface to Martius' work (p. xii.), he advocated the claim of the plant to rank as a species, but compared it to *J. emarginata*. It had, however, already (in 1814 ?) found its true place, by the side of *O. Sphagni*, in Hooker's unrivalled monograph. Unfortunately the two species were confounded and mixed up on the same plate (t. 33) without any doubt being expressed as to their identity. That all succeeding authors should have failed to distinguish them (with almost the sole exception of Dumortier, who first separated the group from *Jungermannia*, and called it *Odontoschisma*—a name ignored by Nees when some years later he substituted that of *Sphagnoecetis*)—that even Nees himself should have lost faith in *J. denudata*—is, I think, owing to their having taken Hooker's figures as final proof of the identity of the two plants; whereas, whoever looks carefully at those figures, with copious examples of the two plants for comparison, will see in them direct evidence to the contrary; the fertile and gemmiparous plants represented being *O. denudatum*, and the sterile *O. Sphagni*. We owe to Professor Lindberg the deserved rehabilitation of *O. denudatum*, in the "Notiser ur Sällsk. pro Fauna et Fl. Fennica, xiii. 1874," to which I refer the reader for the full synonymy of the two species and a list of all the habitats known to the author.

A few salient and easily-observed characters suffice to distinguish the two. In *O. Sphagni* the trailing stems grow out at the apex almost indefinitely—I have seen them six to eight inches long—lengthening by repeated archings, and rooting by flagella at the descending flexures, and are clad throughout almost uniformly with leaves of equal size; the few branches preserve the same habit and character, nor are they ever seen erect and gemmiparous. In *O. denudatum* we have first an intricately-branched leafless caudex, or rhizome, which puts forth assurgent arcuate branched stems that scarcely ever root at the decurved apex; and both stems and branches are (normally), short, linear-lanceolate in outline, from the leaves being longest at the middle of the branch and decreasing in size towards either extremity; but there are nearly always present a few erect branches, gemmiparous at the apex, on which the leaves decrease in size from the base upwards, while the associated folioles increase, so that the upper leaves and folioles are nearly equal in size; whereas the folioles that are scarcely ever absent from the ordinary branches and the stem are many times smaller than the adjacent leaves. But on *O. Sphagni* there are either no folioles at all, or only a few minute ones near the apex of the stem and branches. The leaves scarcely differ in form in the two species, but are rather smaller and more pellucid in *O. denudatum*, and never secund (as often in *O. Sphagni*). Nor is there any marked difference in the involucres and perianths, as the above descriptions will show; but, on the whole, there is no reasonable doubt that the two species should be held distinct.*

In 1845-6 I gathered *Odontoschisma denudatum* abundantly, with perianths and male flowers, along the western foot of the Pyrenees, especially at the entrance of the Vallée d'Ossau, where it grew on the decaying heads of polled Chestnut-trees, and on rotting stumps of other trees, along with (but rarely upon) *Leucobryum glaucum*. In England I have seen it only on crumbling sand-rock near Tunbridge Wells; and in the Andes—only once, and in small quantity—on moist quartzose sand, on Mount Campana, in Peru, at about 1400 metres elevation. So that I have seen it, for the most part, only on *dead* vegetable or mineral matters; while *O. Sphagni* prefers to grow on *living* plants—in European turf-bogs on *Sphagna* and *Leucobryum*; in Amazon forests at the foot and on the roots of trees, or creeping over Mosses on prostrate trunks. *O. denudatum* is given in Sullivant's

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* Lindberg finds the leaf-cells of *O. denudatum* verruculose, those of *O. Sphagni* smooth; but I find a slight and variable degree of verrucosity in the cells of both. This appearance depends on the presence of minute pustules on the outer surface of the cells, mostly equidistant and sometimes closely set in lines (striolæ). They may be beautifully seen in *Trichocolea*, in some *Micropterygia*, &c., and are probably never quite absent from any *Jungermannidea*. I venture with great diffidence to predict that the cell-pustules will one day be proved perforated at the apex, and that it is through these perforations the cells imbibe fluids so readily. I have watched, under a high power, the behaviour of a dried leaf on the application of water, and noticed that the pustules of the cells seemed to first take it up, also that (apparently) they previously emitted minute air-bubbles. Perhaps someone with younger eyes and better instruments may be induced to repeat my observations. The term *endosmose* is one of those contrived to conceal our ignorance of Nature's actual processes; for a membrane permeable to water is plainly not absolutely imperforate.

"Musci Alleghanienses," no. 229, as "*Sphagnoecetis communis*, var. 2," growing on decayed logs; *O. Sphagni*, no. 228, as "*S. communis*, var. 1"—a dense luxuriant patch, on Sphagnum.

I did not once gather *O. Sphagni verum* in the Pyrenees, nor yet in the Andes; but I have seen specimens from the Landes, near Dax, and (as we have seen) it abounds in the great plain lying eastward of the Andes; whereas *O. denudatum* is frequent in the lower Pyrenees, and grows also in the Andes, at a moderate elevation; all which seems to show that *O. Sphagni is a plant of the plains*, and *O. denudatum of the hills*. Further evidence is needed to determine the range in altitude of both species, in the temperate as well as in the torrid zone. I cannot make out the existence of either farther south than lat. 6½°, viz., on Mount Campana. Both species are common in England, but require more accurate discrimination before the localities can be quoted with confidence. The range in climate of *O. Sphagni* is obviously very great, but not unlimited; for it is quite as much at home on the equator, with a temperature ranging from 70° to 90° Fahr., as it is here in lat 54° N., where the thermometer sometimes falls to zero, as on Jan. 1, 1875; but becomes much scarcer beyond the parallel of 60° N.

ADELANTHUS, Mitt. in Journ. Linn. Soc., 1864, 264.

1. ADELANTHUS DECIPIENS (Hook.), Mitt.

Jungermannia decipiens, Hook. in Engl. Bot., t. 2567 (1813); ejusd. Brit. Jung., t. 50; *Plagiochila decipiens*, Dumort. Rec., 1, 15 (1835); G. L. N., Syn. Hep., 24; *Adelanthus decipiens*, Mitt. l.c.; *Odontoschisma decipiens*, Lindberg MSS. in Hartm. Skand. Fl. ii., 144 (1871); ejusd. in Not. Soc. F. Fl. Fenn., 1874, 362; G. et Rabenh. Hep. Eur. n. 474 (1871).

Hab. (var. *andina*) in sylva Canelos et monte Tunguragua Andium Quitensium, alt. 1200-2400 m., ad rupes et truncos prostratos in umbrosis (R.S., a. 1857).

Folia 2·5 longa (ab ipsa insertione antica), 2·0 a basi postica × 2·1 lata; cell. $\frac{1}{24}$-$\frac{1}{20}$; br. int. 1·5; per 3-4 × ·1·5; br. ♂ ·5 × ·4 (× ·75 explanatæ); brlæ. ·25 × ·125, ·13 × ·13 mm.

Cæspites densi, luride virides, siccando fuscescentes, in vivo graveolentes. *Caudices* prostrati, intricato-ramosi, subtus radicellis villosi, fragiles, caules erectos ascendentesve fastigiatos edentes. *Caules* 1-1½-pollicares nigrescentes validi, simplices rarius furcati subramosive, e facie postica stolones paucos flagelliformes plus minus minutifolios plerumque radicelliferos proferentes, apice decurvuli.

Folia inferiora minora subimbricata appressa, superiora majora magis conferta, decurvo-secunda—raro distiche patula—oblique inserta, *basi antica longe sensimque decurrentia*, dein *oblique orbiculata*, apice rotundata retusave, margine antico incurva, postico subplana v. leviter concava et *vel integerrima vel medio distanter* 1-2-3-*spinulosa*, *spinulis postice directis*, cellulis intensius coloratis marginata, media basi *indistincte vittata*. *Cellulæ* subconformes, *majusculæ*, hexagonæ, intus subrotundæ ellipsoideæve, subpellucidæ fere vacuæ, *dimitibus validis trigonisque maximis flavidis*, marginales subquadratæ valde pachydermes, omnes sublævissimæ. *Foliola* caulina nulla v. rudimentaria.

Flores dioici: ♀ ramulo brevissimo postico e caulis basi—raro e medio caule inter folia—oriundo constantes. *Bracteæ* sub ♀, trijugæ tristichæ, extimæ minimæ squamæformes, intimæ foliis paulo breviores, *subrotundæ*, apice *plus minus profunde bifidæ laciniis patulis*, liberæ vel basi subconnatæ, *subintegerrimæ*.—*Ramulus* ♀ apice pro pedicelli receptione profunde excavatus, cavitate pyriformi.

Perianthia foliis caulinis dimidio longiora, ex involucro alte emersa, *anguste obovato-pyriformia turgida, superne obtuse* 3- (*raro* 4-5-) *gona*, ore primum conniventi-clausa demum subtrifida, subdenticulata ciliolatave. *Calyptra* perianthio paulo minor, pyriformis, substantia firma *cellularum stratibus* 3 *conflata* (i.e. semi-infera, e receptaculo alte coalito), apice demum irregulariter trifida, inferne pistillidiis sterilibus sparse obsita.—In unica calyptra numeravi 12 pistillidia abortiva, eidem præcipue prope basin adnata, quorum tamen duo ad dimidiam, unum ad ⅔ calyptræ altitudinem posita fuerunt.—Capsulas, in meis exemplaribus jam decisas, nondum vidi.

Amenta ♂ ramulos tenues albidos julaceos circinatos sistentes, caulis facie postica per totam longitudinem, sed præcipue basin versus, hic illic insidentes. *Bracteæ* 12-jugæ, v. pauciores, arcte imbricatæ, forma singulari subcymbiformes, vel potius cucullum reversum fingentes, valde concavæ et subsaccatæ vix tamen complicatæ, parum inæquilateræ, apice rotundato sæpius integræ raro bidentulæ, pellucidissime areolatæ, antheridium solitarium magnum brevi-pedicellatum foventes. *Bracteolæ* ubique obviæ, bractearum dimidio numero, iisdem 2-4-plo breviores, subrotundæ oblongæve, integerrimæ v. angulatæ, haud raro folio proximo superiore basi connatæ.

Flagella, saltem in dimidio inferiore, folia rudimentaria minutissima tristicha distantia subquadrato-rotunda pellucida gerunt; e cujusque folii basi externa profertur fasciculus parvus radicellarum tenuium fragilium; folia versus flagelli apicem obsoleta nullave, radicellæ copiosiores, evadunt.

Adelanthus decipiens, Hook. (typicus), meipso ad Kenmare Sound, Hiberniæ, lectus, humilior estquam Andinus. *Folia* minora, sæpius distiche patula, aliarum stirpium tamen decurvo-secunda; alia ambitu subrhombea, acuta vel etiam acuminata apiculataque; alia spinoso-bi-tri-lobulata; omnia valde distincte marginata. *Cellulæ* subbasales cæteris paulo majores (neque tamen elongatæ—tales ac in cæteris *Adelanthus* videndæ, unde folia *vittata* fiunt).—In stirpe Andina, nunquam folia vidi nec acuminata nec profunde incisa lobulatave.—In Cubensi, ill. Gottsche delineata (in Rabenh. Hep. Eur., n. 474), perianthia matura spathæformia, hinc pro capsulæ emissione hiantia.

Adelanthus decipiens is not the only Hepatic common to Ireland and the Andes. The following Hepaticæ, growing around Killarney (lat. 52° N. long., 9½° W.), have all been gathered by myself on the volcano Tunguragua (lat. 1½° S., long. 78° W.), at from 4500 to 11,000 English feet (1400-3400 metres) elevation. I add the world-distribution, for comparison.

1. *Marchantia polymorpha*, L.—[Cosmopolitan, but not found in Equatorial America out of the volcanic regions of the Andes, nor below 2000 metres.]
2. *Dumortiera hirsuta* (Sw.), vars.—[In Europe, only in extreme west: Ireland and Pyrenees; then, proceeding westward, in Carolina, W. Indies, Mexico, Andes (N. Granada to Chili), N. Zealand, Australia, Java, S. Africa. I gathered numerous forms in the Andes, the most notable being one with a setose peduncle, but all passing into one another.]
3. *Pallavicinia Lyellii* (Hook.)=*Blyttia*, L., Syn. Hep.— [Cosmopolitan, but local. Brit. Isles, U.S. North America, Mexico, Andes, N. Zealand, Australia, India, Greece, Germany. Descends into Amazonian plain, but sterile. Abundant and fertile in lower Peruvian Andes.]
4. *Fossombronia pusilla* (L.)—[Probably cosmopolitan].
5. *Frullania Hutchinsiæ* (Hook.).—[Found nearly all round the globe, but nowhere common. Europe: only on western side of Brit. Is.; S. States America, Mexico, Equatorial Andes, Java. The New Granadian *F. ciliata*, L. et G., Syn. Hep., 775, is not distinct. I have gathered exactly the same form at Blackwater Bridge, Co. Kerry.]
6. *Lejeunea flava* (Sw.).—There is a fine patch, with perianths, in Sir W. Hooker's herbarium, gathered at Killarney by the late Mr. Mackay; it quite agrees with Swartz's own specimen, from Jamaica, in the same herbarium. [No other European locality known: Probably grows in all tropical countries, and the eastern *L. thymifolia* is certainly not distinct. It is the commonest *Lejeunea* in the Amazonian plain, but barely struggles up to 4500 feet, at the base of Tunguragua, and (as may be supposed) it varies considerably in character, but still between narrow and easily-definable limits.][*]
7. *Lejeunea ovata*, Tayl.—[Hitherto known only in the extreme west of Europe: Killarney and the Pyrenees, in both of which stations I have gathered it, as well as in the Quitenian Andes.]
8. *Lepidozia cupressina* (Sw.), var.—[Germany ?, Ireland, W. Indies, Mexico, Andes.]
9. *Adelanthus decipiens* (Hook.).—[Cornwall, W. Ireland, W. Indies, Andes. All the Scotch and Welsh specimens I have seen under this name are forms of *Plagiochila spinulosa* (Dicks.).]
10. *Acrobolbus Wilsoni* (Tayl.).—[Only localities known: Killarney and Tunguragua; but possibly overlooked in Europe for *Jung. capitata*, Hook.]

On the same mountain, Tunguragua, I found but four Irish (and European) Mosses, viz., *Funaria hygrometrica* (L.), *Ceratodon purpu-*

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[*] *L. diversifolia*, Gotts. in Mex. Leverm.=*L. cucullata*, Nees, var. *stricta*, Syn. Hep., I several years ago picked off a patch of *L. microscopica*, Tayl., gathered at Killarney by Taylor; and it is the "*L. minutissima*, var *major*," of Carrington's "Gleanings among the Irish Cryptogams." It has been gathered in Virginia by Sullivant, and in Mexico by Liebman, but I never found it in S. America, although some of my species are nearly allied to it. It is distinct enough from every other European *Lejeunea*, and also, I think, from the Javan *L. cucullata*.

reus (L.), *Hypnum rutabulum* (L.), and *Bryum julaceum*, Sm. None of these is ever found in equatorial plains, or indeed below 6000 feet in the Andes; and the three first are mere weeds, whereas of the Hepaticæ only the *Marchantia* can be counted a weed, and most of the others are rare and curious species, belonging to widely-separated genera and tribes, and chiefly confined in Europe to the extreme west.

In gathering Mosses and Hepaticæ on the forest-clad slopes of the Peruvian and Quitenian Andes, I have often been forcibly reminded of Killarney, far more than of the Pyrenees. There was the same exuberant growth of the plants themselves, and the frequent recurrence of types—or even of the identical species—characteristic of the Moss-vegetation of Killarney. The broad fronds of *Dumortiera hirsuta*, looking as if cut out of green velvet, spread over rocks moistened by the spray of waterfalls—sometimes associated with the identical *Trichomanes radicans*, and often with *Hymenophylla* that resembled *H. unilaterale*—exactly as at Torc Waterfall. Add to this the broad flakes of *Bazzaniæ*, *Lepidoziæ*, *Lophocoleæ*, and *Plagiochilæ;* the numerous minute and curious *Lejeuneæ*, of which the south-west of Ireland can show more species than all the rest of Europe and Northern Asia put together; the abundance of delicate nerveless-leaved *Hypna*, recalling those elegant species, *H. demissum* and *micans*, discovered by Wilson at Killarney; other more robust *Hypna*, allied to *H. flagellare; Hookeriæ* very like the Irish *H. lætevirens;* beds of luxuriant *Bartramiæ;* exposed rocks sprinkled with tufts of *Grimmia ovata*, or entirely invested with *Hedwigia ciliaris* and *imberbis*, the latter first described by Smith, from Miss Hutchins's Glengariff specimens, and afterwards found in the British Isles only on Snowdon by Wilson—in the island of Osteröe by Blytt—in the equatorial Andes gathered only by myself and Lindig, although I had previously got it in the Pyrenees—and these are the only localities known. This extraordinary accordance between regions so far separated is (to my mind) far from sufficiently explained by the warm Gulf Stream that laves our shores, or by any oscillation of the earth's axis of rotation possible within the actual limits of the obliquity of the ecliptic, or even by the supposed existence at some remote period of continuous land between Europe and America; but I reserve (for the present) my speculations about its origin, and leave my readers at liberty to theorise for themselves.

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2. ADELANTHUS DECURVUS, Mitt. MSS.

Hab in montibus Guayrapurina et Campana Andium Peruvianorum, alt. 800-1000 m. ad arbores vetustas, legit R. S. pl. ♂, a. 1855; insula Antillarum Dominica legit Guilding, pl. ♂ et ♀ (hb. Wilson et Carrington).

Folia 1·2 × ·85, 1·0 × ·75, ·8 × ·65; c. $\frac{1}{45}$-$\frac{1}{40}$; bracteæ ♀ 1·0 longæ; per 2·9 × 1·1, 1·3 × 0·9; br. ♂ ·4 longæ; brlæ. ·25 × ·125; anth. ·125 mm.

Cæspites lati, ex albido flavicantes. *Caudices* prostrati, nigrescentes, tenues fragiles intricato-ramosi subaphylli subtus radicelloso-tomentelli, caules ascendentes et flagella demissa proferentes. *Caules* 1-1½-pollicares, subrufi, simplices parcissimeve ramosi,

ramique decurvi, siccando fere circinati, tenues vero validiusculi, basin versus—aliquando etiam apice attenuato—microphylli, ipsa basi subradicellosi, cæterum arhizi.

Folia dissitiuscula, accumbentia ("verticalia" dicta), fere transverse inserta, *basi antica brevissime decurrentia*, madefacta lateraliter patentia plane succuba, siccando decurvo-secunda appressaque unde incuba viderentur, *oblique ovato-rotunda* (ramea subobovata), margine antico rectiusculo toto fere anguste incurva integerrimaque vel apicem versus 1-2-dentata, *postico rotundato spinuloso-serrata-dentatave, dentibus* 15-20 *subinæqualibus divergentibus*, nonnulla apice subbifida. *Cellulæ* parvulæ subæquilateræ pellucidæ, limitibus pallide flavidis validiusculis, *ad angulos parum incrassatis*, endochromio pallido, v. sparso v. in annulum congesto; marginales (anticæ præcipue) crassiores, transverse rectangulares; *subbasales plurimæ mediæ cæteris duplo majores, subelongatæ, discolores, vittam* fingentes.

Flores dioici: utriusque sexus e caudice, vel caulium basi nuda, orti, postici. *Bracteæ* ♀ sub 3-jugæ, tristichæ; intimæ (laterales) f. caulinis subæquimagnæ, *suborbiculatæ, latiores quam longæ, apice varie lobatæ, lobis inciso-spinosis ciliatisve*; *bracteola* tamen sæpe multo longior, anguste oblonga, superne parce spinuloso-denticulata apice ciliata.

Perianthia alte emersa *ovato-fusiformia* (subinde breviora et subrotunda) *turgida, obtuse* 3-5-*carinata*, ore constricto ciliata. *Calyptra* (juvenilis, et cum capsula adhuc concreta) *incrassata, e cellularum stratis* 4 *conflata*, pistillidiis sterilibus obsita.

Amenta ♂ tenuia albida incurva; bracteæ 3-8-jugæ, julaceo-imbricatæ tenerrimæ suborbiculatæ (multo latiores quam longæ) cochleato-concavæ, apice rotundato spinuloso-denticulatæ v. subintegerrimæ, margine antico toto in lobulum apice spinosum late incurvæ involutæve, singulæ *antheridium solitarium magnum globosum, vel duo parvula, foventes*. *Bracteolæ* ubique adjectæ, bracteis vix duplo breviores, cuneato-ligulatæ, apice breviter bifidæ, segmentis apiculato-acutis, subdenticulatæ.

3. ADELANTHUS UNCIFORMIS (Tayl. et Hook. f.).

Jungermannia unciformis, Tayl. Lond. Journ. Bot., 1844, 457; *J. sphalera*, ejusd. l.c., 458; *Plagiochila unciformis*, Tayl. et Hook. f., et *Pl. sphalera* eorund., G. L. et N. Syn. Hep., 653.

Folia 2·0 × 1·2; cell. $\frac{1}{60}$-$\frac{1}{40}$, basales $\frac{1}{12}$-$\frac{1}{10}$; per 2·0 mm.

Hab. ad fretum Magellanicum legit ill. Hook. fil.

Caudices prostrati tenues ramosi intertexti. *Caules* assurgentes simplices vel subdivisi flagelliferique, *ramique apice plus minus decurvo-uncinati*, interdum subfastigiati.

Folia rufo-badia rigidiuscula *fragilia*, fere transversa, basi antica tamen *subdecurrentia*, decurvo-secunda, arcte imbricata, siccando appressa, *oblique ovata acuta subacuminatave*, margine antico toto valide anguste incurvo integerrima v. solum apicem versus subdenticulata, *postico plano toto subspinuloso-dentata, dentibus inæqualibus*. *Cellulæ* opacæ guttulatæ pachydermes, mediæ æquilateræ ($\frac{1}{40}$ mm.), submarginales dimidio minores ($\frac{1}{60}$ mm.), *inferiores axin versus*, a basi fere ad folii dimidium usque, rectangulares, plus minus *elongatæ* ($\frac{1}{12}$-$\frac{1}{10}$ mm. longæ) *vittam sistentes*. *Foliola* 0.

Flores dioici : ♀ ramulo brevi, e caudice, vel e caulis basi oriundo constantes. *Bracteæ* tristichæ, trijugæ, extimæ minutæ orbiculares emarginatæ, intimæ foliis subbreviores *ovato-rotundæ apice* 2-3-*lobulatæ, lobulis apiculatis spinulosis.*—*Ramulus* ♀, pro pedicelli receptione ab apice fere ad basin usque excavatus, cavitate pyriformi obconicave.

Perianthia foliis æquilonga, iis *A. decipientis* sat similia, *turgide fusiformia, quasi vesicularia,* superne *leviter 5-gona,* apice ipso in lobulos 5 breves apiculatos spinuloso-denticulatos fissa, demum hinc a basi ad apicem usque capsulæ protrusione hiantia (ad spathæ instar). *Calyptra* $\frac{1}{4}$ brevior ovali-globosa, substantia firma, 6 *cellulas crassa,* basi et altius pistillidis plurimis—aliis in squamulas foliaceas transmutatis—obsita. *Capsula* majuscula elongato-ovalis quadrivalvis.

4. ADELANTHUS MAGELLANICUS (Lindenb.).

Plagiochila magellanica, Lindenb. Sp. Hep., 164; G. L. et N. Syn. Hep., 53.

Hab. ad fretum Magellanicum, ab ill. Hook. f. lectus, sæpe in eodem cæspite cum *A. uncinato* consociatus, certe differt *foliis triplo minoribus, suborbiculatis,* latioribus quam longis, *integerrimis*—nec ovatis acutis dentatis. Perianthia nondum vidi, foliis tamen margine antico valide incurvis, cellulis elongatis discoloribus vittatis, &c., sine dubio ad *Adelanthum* (nec ad *Plagiochilam*) referenda.

5. ADELANTHUS FALCATUS (Hook.), Mitt.

Jung. falcata, Hook. Musc. Exot., t. 89; *Plagiochila f.*, Syn. Hep, 649.

Hab. in N. Zelandia, primum a cl. Menzies lectus; caule ramosiore; ramis insigniter falcatis; foliis subrotundis, margine antico minus incurvis, postico dentato-serratis, &c., speciem quintam optime distinctam præbet.

Before dismissing these closely-allied genera, I add a few differences —probably of slight importance—but apparently constant.

The *flagella* in *Odontoschisma* are clad with radicles alone, the leaves being altogether obsolete; in *Anomoclada* have the tristichous leaves reduced to minute nodules or tubercles, with a fascicle of radicles from the base of each; in *Adelanthus* have the leaves more developed, reaching at least the grade of minute scales.

In *Adelanthus* the fertile ramulus is scarcely so long as the perianth that terminates it, and it is excavated to the very base for the reception of the pedicel, which falls away completely along with the empty capsule, leaving the ramulus with a pyriform hollow within. But in *Odontoschisma* the cavity in the fertile ramulus is "cylindrica, fundo rotundata," and the basal portion of the pedicel is sometimes retained within it, when the upper portion has disarticulated and fallen away along with the capsule.

Among recent additions to the British Hepaticæ is a fine tall plant—perhaps widely distributed in the Scottish Highlands, but overlooked from its external similarity to *Nardia compressa* (=*Jungermannia compressa,* Hook.)—which was first distinguished as a species by Dr. Stirton, who called it *Alicularia viridis* in his MSS. It had

already existed for many years in herbaria, confounded with *J. compressa*, and I have myself a fine patch of it, mixed with *Mastigophora Woodsii*, given me by the late Dr. Greville, and marked "Sutherlandshire, 1830"; but it was not published until 1870, when Dr. Carrington described it in the tenth volume of the "Transactions of the Botanical Society of Edinburgh," under the name of *Adelanthus Carringtoni*, Balf. MSS. Unfortunately, as in the case also of *A. decipiens*, *Metzgeria pubescens*, and some other Hepatics, we seem to have only the male plant in these islands, and it has proved insufficient to show the true affinities of the species; but having been furnished with good specimens from three different localities by the late Mr. G. E. Hunt, besides those of Greville, I made a thorough analysis of it, and finding the habit very like that of *Adelanthus*, and that the decurved accumbent leaves had sometimes a few teeth or cilia, I was not unwilling to consider it a probable member of that genus. My surprise, however, was great at finding that no one else had noticed the toothing of the leaves, and that absolutely no mention was made of it by Carrington himself in either of his published descriptions (see Brit. Hep., p. 27). I have consequently repeated my observations, and have satisfied myself of their accuracy.

The terminal male inflorescence has been supposed to quite remove this plant beyond the limits of *Adelanthus*. I am not so sure of that, for it does not preclude the occasional co-existence of lateral male spikes. I have learnt, by an extensive study of the variations of sex in the Hepaticæ, that a dimorphous male inflorescence is by no means uncommon; it is, for instance, the rule rather than the exception in many *Cephaloziæ*, *Lejeuneæ*, &c.; and even in *Odontoschisma Sphagni* (as may be seen from my description), although the andrœcia are normally minute white curled lateral catkins, I have found an instance of a main stem ending in a robust green male spike! The antheridia, however, of *A. Carringtoni*, which I have not found in any of my ♂ spikes, are said by Carrington to be two or three in the axil of each bract, and this character, I admit, seems to sunder it from *Adelanthus*, and all the allied genera, in which the ♂ bracts are normally monandrous. Yet even in *Adelanthus decurvus* (vide supra) I have occasionally seen the solitary large antheridium replaced by a pair of small ones. That the fruit when found may prove *A. Carringtoni* to be the type of a new genus—perhaps the acranthous analogue of the pleuranthous *Adelanthus*—is certainly not beyond the bounds of possibility. Meantime I venture to suggest that it is more probably a congener of a section of *Jungermannia* proper—consisting of some half-dozen species, whereof the handsome *J. colorata*, Nees, may be considered the type—which it remarkably resembles in habit and character. These species are all so like miniature copies of *Jamesonia* among Ferns—in the tall slender stems, continually unrolling and growing out at the circinate apex, and closely set with round leaves (which represent the small distichous pinnæ of the Fern)—that I propose to form them into a subgenus, and call it *Jamesoniella*. From *Eujungermannia* it differs mainly in the indefinitely-elongating stems, and in the entire leaves being combined with an involucre of deeply-cut bracts that surround the large pluriplicate perianth like a frill.

The species certainly belonging to *Jamesoniella* are chiefly natives of the Andes and the Sandwich Islands; but *J. colorata* itself not only grows throughout the entire length of the Andes (Mexico, Ecuador, Chili, C. Horn, Falkland Is.), but circuits the world in the south temperate zone (Australia, Tasmania, New Zealand, C. Horn, C. Good Hope, Kerguelen Is.). Fine specimens with perianths were collected by Dr. Hooker in several of these localities in the Antarctic expedition. I was not fortunate enough to find it in fertile state, but I have seen few more beautiful sights than the broad dense patches, six to eight inches high, and of the finest rose-colour, of *J. colorata*, as it grows under the shade of Ericeæ (Gaultherias, Vacciniums, &c.) on Tunguragua, at about 8000 feet.

(*To be continued.*)

ON *ZYGODON RUPESTRIS*.*

By Chas. P. Hobkirk.

In February, 1875, amongst a number of Mosses received from my friend, Mr. S. A. Stewart, of Belfast, was one labelled *Zygodon viridissimus*, gathered on some Basaltic rocks near that town. On a microscopical examination I found that it was not the typical *Z. viridissimus*, but the form called *Z. rupestris* by Dr. Schimper, as far as I could judge, and on comparing it with a specimen from Dr. Zettustedt from Sweden I was the more convinced that such was the case, the Belfast specimen being the exact counterpart of the Swedish one. On searching for a detailed description of Schimper's Moss I was unable to find anything more definite than Dr. Braithwaite's short note in "Journal of Botany," vol. ii., N.S., p. 199, which I here transcribe:—

"*Z. viridissimus*, *β. rupestris*, Lindb. in Hartm. Exsic. (1861); Hartm. Skand. Fl., p. 52 (1864). *β. saxicola*, Molendo in Lorentz Moosstudien, p. 95 (1864). *Z. Stirtoni*, Schp. MS.

"Much more robust than the ordinary form. Leaves longer and narrower, with shorter points, and more opaque. Capsules rather more elongated."

This being very unsatisfactory, and having no large public library of reference at hand, I wrote to ask my friend Mr. Baker if he could furnish me with a copy of the diagnosis from any of the works at Kew, but he was unable to find anything. My curiosity was roused, and not liking to let the matter drop, I wrote to one or two of my friends to ask for the loan of specimens for examination, and I now propose to lay before the readers of the "Journal of Botany" the results of this examination, with a view of ascertaining if possible whether this rock form should be considered as a species or merely a variety of *viridissimus*.

The chief distinction between our form and the type lies in the nerve, which is almost always exserted and of a colour varying from light to dark reddish-brown, and in the apex of the leaf.

In the Swedish specimens the leaf is scarcely narrowed at the base, and gradually becoming slightly narrower to near the apex, where it is very suddenly narrowed off to the excurrent nerve—indeed the leaf is much more nearly ligulate than in the typical form; the nerve is deeply coloured, semi-transparent, and distinctly excurrent into a short mucro, and is rather rigid throughout its whole length. The whole plant also partakes more or less of a brownish-green tint. In the Irish plant from Basaltic rocks in Gleno, Co. Antrim, the leaf is of the same shape and tint, the nerve thick, semi-transparent, in the older leaves almost opaque, and coloured, but not quite so deeply as in the Swedish plant, quite as much excurrent, and, like it, very prominent at the back.

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* Read at Conference of Cryptogamic Society of Perth, 30th September, 1875.

A plant gathered by the late W. Wilson at Beaumaris in Nov., 1867, and labelled by him *Z. viridissimus*, var. *Stirtoni*, presents us with the same shape in the leaf; the nerve is distinctly excurrent, reddish at the base only in the younger leaves, but throughout its whole length in the older and fully developed ones.

Of a number of specimens from Scotland, from Rev. J. Fergusson, No. 1, from Troup, 1869, has the nerve very strong and slightly thickened at apex like the preceding ones, and in all respects agrees with the other forms.

No. 2, also from Troup, 1869. I find from my notes that in the full-grown leaves the characters are almost exactly similar; in one or two of the leaves the nerve seemed to vanish when looked at from the upper side, but on varying the light from the reflector and altering the focus a little it could still be distinctly traced to the apex, though not quite so much excurrent; still in the *majority* of the leaves it was quite as much excurrent as before. Other characters the same.

No. 3, labelled *Z. Stirtoni*, Forfarshire. The nerve is not always deeply coloured, but is always excurrent; in other respects the same as before.

No. 4, Forfarshire. Some of the leaves are slightly more acute or less obtuse than usual, but in all other particulars the same.

No. 5, Forfarshire. Mr. Fergusson writes of this as "an intermediate form, with nerves sometimes excurrent and pellucid and sometimes not," but the latter is only the case in the leaves of the innovations, and even in them it is quite excurrent, and all the older leaves are remarkable for their strongly projecting excurrent nerve, thickened at apex, and the ruddy-green colour of the whole plant.

No. 6, Forfarshire, presents the same characteristics as the last.

A small scrap from Mr. J. G. Baker, of Kew, from the "Basaltwande des Riedberg, G. A. Geheeb," labelled *Z. rupestris*, Schp., certainly seems more like an intermediate form; the plant is generally much greener, the nerve thinner, transparent, not often brownish, and very nearly always vanishing. Except for its high authority, I should be inclined to refer it to *viridissimus*.

Another plant, gathered by Mr. Briggs on walls at Plymouth, 1869, labelled *Zygodon?*, kindly sent by Mr. Baker, is almost the exact counterpart of Geheeb's plant.

Now the question arises, should the almost ligulate, suddenly tapered, and rather obtuse pointed leaf, terminating in a mucro formed by a strong, ruddy, scarcely transparent, excurrent nerve, warrant the separation of this form into a separate species, under the title *Z.*

rupestris, or are these characters not of sufficient importance, considering certain intermediate forms, to cause it to rank higher than a variety? Of course the decision will rest very much upon our ideas of what a species is. From a Darwinian point of view, I think we should call it at the least an incipient species, altered somewhat perhaps from a change of habitat or environment. Then, again, the excurrence or otherwise of a nerve is considered of some value as a specific distinction in many cases, and in this particular one, where all the other British species of the genus have a nerve vanishing below the apex, it should have a higher value. Then, again, the shape of the leaf is not the same; while *viridissimus* has a leaf which from its widest portion—nearer the base than the middle—gradually and regularly tapers upwards to an acute apex, that of *rupestris* is very nearly the same width throughout its whole length, or at any rate is only very slightly narrower at the point where it suddenly bends towards the nerve. The name *viridissimus* itself indicates the intense green colour of the fresh plant found on trees, whereas the rock specimens are almost always more or less of a brownish-green colour; and though this may possibly be owing to the difference in their habitat, yet still the name *viridissimus* is certainly inapplicable to a species which includes a variety of so different a hue; but this is only of minor importance. There are one or two foreign species which possess an excurrent nerve, as *Z. anomalus*, Dz. et Molkb., and *Z. Schimperi*, Hmp.; in the latter it is very similar to our plants, viz., "*nervo excurrente ferrugineo*," according to Mueller.

I have been led to make these few remarks with the hope of calling the attention of much more competent bryologists than myself to this rock form, which I think has perhaps been somewhat hastily referred to *viridissimus* as a variety, and of ascertaining from them whether these characters, combined with its habitat, are not sufficient to raise it to the rank of a species. On comparing the characters on which many other species are based, I think it will stand a fair comparison with many of them, as for instance, the slight difference between *Bryum sanguineum* and *B. murale*.

In conclusion, I beg to thank those gentlemen who have so readily favoured me with specimens for their great kindness in so doing, viz., Messrs. J. G. Baker, S. A. Stewart, Dr. Trimen, and the Rev. J Fergusson.

Huddersfield, July 10, 1875.

P.S.—Since writing the above I have received the 2nd edition of Schimper's Synop. Musc. Europ., 1876, in which I am somewhat surprised to find that no mention is made of this form, either as a species or a variety.

NOTES ON SOME CHINESE PLANTS, WITH DESCRIPTIONS OF A FEW NEW SPECIES.

By W. B. Hemsley, A.L.S.

So little is known respecting the botany of the interior of China, and so much yet remains to be done in the investigation of the vegetation of the more fully explored coast region, that almost every collection of plants we receive from that country contains some novelties. Last year Mr. F. B. Forbes, of Shanghai, placed in my hands for determination a small collection of plants from various parts of China, with the request that I would publish anything of interest it might contain. I venture to assume that it is not out of place here to mention that this gentleman, who is on a visit to Europe, is devoting much time and means to the elucidation of the flora of China, for which purpose I have drawn up a list for him of all the Chinese plants of which there are specimens in the Kew Herbarium. Moreover, it is his intention on returning to China to organise a botanical club among the residents at the different stations; and with the material and knowledge he has gained here, he will be in a position, in conjunction with his friend Dr. Hance, to render some important services to botany. The plants in question are from Kiukiang, collected by Chinese; from Ningpo, also collected by natives; from the Feng-wang-Shan hills, eighteen miles from Shanghai, and Ta-hoo Lake, about seventy-five miles south-west of Shanghai, collected by Mr. Forbes himself; and from Chefoo, collected by himself and his brother-in-law, Dr. Carmichael. The Kiukiang and Ningpo specimens contain several new species, but they are most of them so fragmentary that I must not attempt to describe them. They include most of the new species collected by Dr. Shearer, and described by Mr. Moore in last year's "Journal of Botany," 1875, pp. 225-231.

I select the following for remark :—

1. *Thalictrum*, sp. Kiukiang, insufficient for determination.

2. *Ranunculus*, sp. Kiukiang, probably a variety of *R. acris*.

3. *Aconitum*, sp. Kiukiang. This plant is in Kew Herbarium, from the Amur country, labelled "*A. Lycoctonum*, L., var. *septentrionale*, lusus volubile," Maximowicz.

4. *A.*, sp. Chefoo hills, above Bamboo Temple. I at first regarded this as a distinct new species and drew up a description of it; but I dare not venture to publish it as such. The same plant was collected by Dr. Shearer at Kiukiang, and Mr. Moore has named it "*A. chinense*, Sieb." There is also a specimen in the Kew Herbarium, collected by Fortune, which perhaps belongs to the same species. Indeed it bears the name, in Mr. Bentham's handwriting. But I am quite unable to identify these specimens with the figures and descriptions of *A. chinense* in "Paxton's Magazine" and the "Botanical Magazine," or with the garden specimens preserved at Kew, from which the "Bot. Mag." plate was probably prepared. The original publication of this species appears to be in "Paxton's Magazine"; at least I can find nothing anterior. Without giving this plant a name, I may append the following description of the specimen from Chefoo, which does not differ materially from the others.

Herba perennis erecta; folia radicalia mihi ignota, caulina petiolata coriacea sparse et minute pubescentia tripartita lobis lateralibus profunde bifidis centrali obovato-spathulata, omnibus basi valde attenuatis lobis secundariis brevibus latis rotundatis mucronatis vel lanceolatis acutis; floribus magnis albo-cæruleis leviter pilosis longe pedicellatis, sepalis anticis obliquiter lineari-oblongis, lateralibus obovato-rotundatis, postico elongato-cucullato, filamentis ad medium late scarioso-alatis; folliculis 5 erectis reticulato-nervosis stylo persistente coronatis.

5. *Nasturtium officinale*, L., var. Ta-hoo Lake. This is remarkable for its very large flowers.

6. *Orychophragmus sonchifolius*, Bunge. Feng-wang-Shan. The stem-leaves of these specimens are deeply pinnatifid, instead of being simply toothed, as in the original specimens.

7. *Hypericum electrocarpum*, Maxim. Kiukiang. From authentically named specimens, Hance's *H. Sampsoni* and this appear to be identical.

8. *H.*, sp. n.? Ningpo district. Without studying the whole genus, there is too much risk of adding to existing synonymy by founding a species on a single specimen, however distinct it may appear. The present plant has slender, obscurely 4-angled stems, sessile, narrow, lanceolate-oblong, acute leaves, from two to three inches long by half an inch wide, with numerous very small and inconspicuous (in the dried state at least) glands, and large terminal flowers, with broad sepals and narrow petals nearly an inch long, and the three styles are about a quarter of an inch long and united to above the middle.

9. *H.*, sp. n.? Kiukiang. This is a robust species of the type of *H. Ascyron*, but I refrain from giving it a name for reasons indicated under the last. The material in this case would be ample, if I could be sure the species is an unpublished one. It has a tall, stout, angular stem, ovate-lanceolate leaves, about three inches long, large flowers with rather narrow petals and five short free styles. There is also a specimen, apparently of the same species, with smaller lanceolate ternately verticillate leaves.

10. *Zanthoxylon*, sp. ♂ flowers only. Feng-wang-Shan.

11. *Rhamnus*, sp. Ta-hoo Lake. It is the same as Fortune's number 37, and possibly a variety of *R. globosus*, Bge, which Maximowicz unites with *R. virgatus*, Roxb.

12. *Rhamnus*, sp. n.? Kiukiang. Insufficient for description.

13. *Pueraria*, sp. Kiukiang. The same plant was collected by Oldham (n. 178) in Formosa, and it seems to be identical with *Pachyrhizus mollis*, Hassk.

14. *Dunbaria* (*Atylosia*) *subrhombea*, Miq. Kiukiang. There a only Japanese specimens of this plant at Kew.

15. *Millettia*, sp. n.? Ningpo. Only a fragment.

16. *Cratægus cuneata*, S. & Z. Kiukiang. Fruiting specimens of a Japanese species.

17. *Lythrum virgatum*, L. Chefoo.

18. *Liquidambar*, sp. Kiukiang. A small branch without either flowers or fruit. It bears a great resemblance to the American *L. styraciflua*, but it may be a variety of *L. formosana*, which, judging from the specimens at Kew so named, is an exceedingly variable species.

19. *Acanthopanax?* Feng-wang-Shan. Possibly a new species, but there are only quite young flowers.

20. *Lobelia*, sp. Kiukiang. One of the small-flowered tufted set, near *L. cæspitosa*, Bl.

21. ADENOPHORA ISABELLÆ, *Hemsl.*, n. sp.—Herba perennis (?) ramosa 2-3 ped. alta; foliis radicalibus non vidi, caulinis cordatis ovato-cordatisve acutis grosse duplicato-serratis parce hispido-pilosis

ad 2 poll. longis latisque petiolo circiter sesquipoll. longis; floribus racemoso-paniculatis, breviter pedicellatis, bracteatis, bracteis parvis lanceolatis acutis, calycis lobis glaucis oblongo-lanceolatis per anthesin ad 4 lin. longis, persistentibus et auctis, corolla ad poll. longa lataque, lobis rotundatis sub-acutis, ovario triloculare polyspermi.—*Habitat* in collibus vicinitate Chefoo leg. cl. Forbes.

A very distinct species in its cordate petiolate stem-leaves, etc., which I have dedicated to Mrs. F. B. Forbes, the discoverer.

22. *Adina rubella*, Hance. Kiukiang.

23. *Senecio* (*Cacalia*) *hastata*, L. Kiukiang. This very striking plant has not previously been collected south of Manchuria.

24. *Saussurea*, sp. n. Kiukiang; same from Dr. Shearer.

25. *Artemisia anomala*, Moore. Kiukiang.

26. *Oleinearum*, genus novum? Shanghai. It is singular that this shrub, which is commonly used for hedges about Shanghai, has not been described. It was collected by Fortune and others; but only the flowers are known, and therefore it is impossible to say whether it is the type of a distinct genus or not. It is a deciduous shrub, having the general aspect of a *Ligustrum*, but the flowers are axillary, and very closely resemble those of *Fontanesia phillyræoides*. In some respects, too, it approaches *Chionanthus* and *Osmanthus*.

27. *Calystegia*, sp. Kiukiang. This is the same as Hance's 6507, and perhaps *C. acetosæfolia*, Turcz., a species found in the Amur country.

28. *Salvia officinalis*, L. Kiukiang. This is probably cultivated, but I have seen no other specimens from China.

29. *Scutellaria sciaphila*, S. Moore. Interesting for the new locality, Chefoo.

30. *Teucrium nepetæfolium*, Bth. Very fine specimens from the Ta-hoo Lake.

31. *Peristrophe chinensis*, Nees. Additional specimens of this rare plant from Ningpo.

32. RUELLIA SECLUSA, *S. Moore*, sp. n.—Caule erecto obtuse quadrangulari demum glabrescente, foliis oblanceolatis acutis basi in petiolum brevem sensim angustatis margine dentato-undulatis pilis appressis brevibus munitis, inflorescentia glomerulas congestas paucifloras terminales axillaresve constituente, bracteis lanceolatis calycem subæquantibus, calycis segmentis lineari-lanceolatis acutis glabrescentibus, corolla hypocraterimorpho-campanulata tubo gracili limbo ampliato lobis late ovato-rotundatis, antherarum loculis quadrilateralibus.

Folia $1\frac{1}{2}$-3 unc. longa, $\frac{1}{2}$-$\frac{3}{4}$ unc. lata. Corollæ tubus 4 lin. longus; limbus 8 lin. diam., extus puberulis. Ovarium fere a basi circiter 12-ovulatum, glabrum.—*Habitat* Kiukiang.

Planta *R. venustæ*, Hance, simillima, a quo inter alia floribus minoribus insigniter differt.

I am indebted to Mr. S. Le M. Moore for the determination and description of this plant.

33. *Verbena*, sp. n.? Kiukiang. Should this supposition prove correct, this plant is an interesting addition to the flora of China.

34. *Premna*, sp. n.? Kiukiang. There is little doubt that this is a new species, but the specimen is insufficient to furnish a satisfactory diagnosis.

35. *Vitex cannabinæfolia*, S. & Z. Chefoo. A Japanese species, now recorded, I believe, for the first time from China.

36. *Didymocarpus Auricula*, S. Moore. Kiukiang. These specimens supplement those collected by Dr. Shearer, and include flowers of an apparently distinct variety.

37. *Mazus*, sp. (*M. rugosi* var. ?). Chefoo. I hesitated about describing this as a new species, but decided at last not to do so. The flowers of this genus are extremely delicate, and it is very difficult to ascertain the shape of the corolla from dried specimens. This plant differs from the ordinary *M. rugosus* in having oblong-lanceolate, not obovate, leaves, and in the tube of the corolla being very narrow. It was collected by Dr. Carmichael, and I would suggest associating his name with it should future investigations prove it to be distinct.

38. M. VILLOSUS, *Hemsl.*, n. sp.—Herba erecta (non sarmentosa) tota, nisi corolla, sericeo-albido villosa, caulibus foliosis 6-9 poll., foliis sessilibus oppositis suboppositisve oblongis lanceolatisve acutis obtuse vel acute remoto-dentatis 1½-2 poll. longis; floribus purpureis pro genere maximis racemosis pedicellatis bracteatis, bracteis parvis lanceolatis acutis, calycis lobis latis acutis persistentibus auctis, corollæ tubo brevi lato, labio superiore profunde bifido, segmentis linearibus inferiore fere triplo longiore late trilobato.—*Habitat* Ta-hoo Lake, Forbes; Kiukiang, Shearer; ad sinum Ta-lien-hwan, Hb. Hance.

This seems to be a very distinct species in its erect, leafy stems, clothed with long white hairs, and in the broad short tube and narrow lobes of the upper lip of the corolla. Hance says of it, "valde affinis *M. rugoso*, Lour., sed distinctus videtur forma nervationesque fol. calycis et foliorum imis etiam sessilibus forma." The specimens from all the localities quoted exhibit the same characters.

39. *Bungea Sheareri*, S. Moore. Kiukiang. Excellent specimens of this interesting plant.

40. *Pedicularis*, sp. Kiukiang. This is a trailing, very distinct species, perhaps identical with some North Chinese species which I have not seen.

41. *Melampyrum pratense*, L. Kiukiang. New from this region.

42. *Lindera glauca*, Bl. Feng-wang-Shan. There were only Japanese specimens of this plant in Kew Herbarium.

43. *Wickstræmia*, sp. (? *W. virgatæ* var.). Kiukiang. I think there is little doubt that this is a variety of the variable Indian *W. virgata*, which includes *W. canescens*.

44. *Daphne*, sp. Kiukiang. Perhaps a new species, but the material is insufficient to determine this question.

45. *Ficus pumila*, L. Kiukiang.

46. *Planera japonica*, Miq. Ta-hoo Lake. These are the first Chinese specimens I have seen.

47. GYMNADENIA TRYPHIÆFORMIS, *Rchb. f. M.S.*, 1867.—Gracilis usque sexpollicaris, folio bene evoluto unico cuneato oblongo acuto, caule gracili sub racemo haud ita denso univaginato, bracteis triangulari-acuminatis ovaria pedicellata dimidia æquantibus, sepalis tepalisque ellipticis obtuse acutis uninerviis, labello flabellato trifido, laciniis lateralibus linearibus nunc retusis, lacinia mediana plus duplo latiore cuneata oblonga retusa nunc emarginata, disco velutino, calcari cylindraceo acutiusculo seu obtuso (compresso ?), ovarium subdimidium subæquanti.

Juxta *Gymnadeniam tridentatam*, Lindl., a quo calcari brevi ac labello trifido ac habitu gracillimo longe recedit.—*Habitat* Kiukiang, Korean Archipelago, Hb. Kew et Rchb. f.

Dr. Reichenbach kindly forwarded the foregoing description in reply to Professor Oliver, who had sent him a specimen for determination.

48. *Tricyrtis elegans*, Wall.

49. *T. macropoda*, Miq. Kiukiang. These are both new from this region.

50. *Carex transversa*, Boott. Kiukiang. Previously only reported from Japan.

51. *C. monadelpha*, Boott. Ta-hoo Lake.

52. *C.*, sp. Ta-hoo Lake. A very distinct species, which I have not been able to determine from the specimens at Kew. It has solitary separate male and female spikelets and very hairy fruits and bracts.

53. *Phyllostachys nigra*, Munro. Ta-hoo Lake. These specimens are in flower, and General Munro identifies them as belonging to the plant named, of which he had previously seen no flowers.

54. *Bromus japonicus*, Thbg. Kiukiang. I do not find that this differs from the Japanese specimens.

ON A MONGOLIAN GRASS PRODUCING INTOXICATION IN CATTLE.

By H. F. Hance, Ph.D., etc.

Doubts have been cast of late years on the accuracy of the belief formerly generally held, that certain Grasses possess narcotic or inebriating properties. The old and widely-spread ill repute of our *Lolium temulentum*, Linn., for such qualities is well known. But, in the last edition of his "Vegetable Kingdom," the late Prof. Lindley wrote, "The noxious properties of Darnel seem to rest upon no certain proof. That formidable list of mischief belonging to its seeds, of which Haller says so much, resembles what might be expected of some ergotised Grass. At all events, the properties of Darnel should be made the subject of renewed inquiry."[*] However, in one of the latest and best general works on systematic botany, the authors speak of its fruit as causing, when mixed with cereal grains, "des vomissements, des vertiges et l'ivresse."[†] And, quite recently, Dr. John Shaw, in a most interesting paper on the disturbing influence of extensive sheep-farming on the vegetation of South Africa, speaks of certain parts of the country there having to be passed over by transport riders with their oxen without pausing, "on account of the *Melicæ* (the 'Dronk' Grass of the Dutch colonists), which have increased to an extent scarcely to be fancied in the last few years, and on eating which cattle become afflicted with intoxication to an alarming extent."[‡] There is no allusion to this property in Nees' "Gramineæ Africæ Australioris."

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[*] Lindley, Veg. Kingd., 116 b.

[†] Le Maout et Decaisne, Traité gén. de bot., 613.

[‡] Journ. Linn. Soc. Bot. xiv., 208.

I received a short while since from Dr. Bretschneider, physician to the Russian Legation at Peking, specimens of a Grass which had been forwarded to the Count de Rochechouart, the French Minister at that capital, by a Roman Catholic missionary, accompanied by the following note:—"J'envoie ci-joint un petit paquet d'herbe que les Chinois nomment *tsoui tsao* (herbe enivrante). Les Mongols la nomment herbe vénéneuse. On la trouve en abondance sur les monts Alachan.* Nous étions allés faire une excursion sur la montagne. Nos chevaux, ayant probablement mangé abondamment de cette herbe la nuit, pouvaient à peine se tenir debout le matin. Une famille mongole campée à cet endroit nous conseilla de donner du vinaigre comme contrepoison. Comme nous n'en avions pas, nous donnâmes du lait aigri. On nous indiqua aussi comme remède souverain la décoction d'une tête de chèvre. Nous servîmes ce bouillon à nos chevaux, qui s'en trouvaient bien. Les troupeaux de chevaux, bœufs, moutons et chameaux qui paissent sur les montagnes n'en souffrent pas, soit qu'ils évitent de manger de cette herbe, soit qu'ils s'accoutument à ce poison."

The specimens received are a good deal broken up, and destitute of root and stem-base, but they suffice for a satisfactory examination, and, so far as herbarium materials and the literary resources at my disposal enable me to judge, they belong to an undescribed species of *Stipa*.

Exclusive of four species of the osculant section *Leptanthele*,† referred to *Stipa* by Turczaninow, to *Lasiagrostis* by Trinius and Ruprecht,‡ and distinguished generically under the name of *Ptilagrostis* by Grisebach,§ who, however, subsequently observed‖ that it differs only from *Stipa* by the herbaceous texture of the fruiting glumella and the flexuose, scarcely twisted awn; there are, I believe, but eleven species of *Stipa* hitherto recorded as natives of the mountain plateaux or steppes of Central and North-eastern Asia. Six of these¶ have plumose awns; of the remaining five** all but *Stipa sibiricia*, Linn., differ from the plant of which I am now treating by having the apices of the anther-cells glabrous or inappendiculate. This character, slight as it may appear, is, I believe, absolutely constant and invariable in each species. From *S. sibirica* the inner Mongolian Grass is perfectly distinct by its inflorescence, smaller flowers, and other notes. I subjoin a diagnosis.

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* "Ala shan Eleuths form one banner; their country lies west of Ninghiá fn in Kán suh, and north of the Great Wall, as far as Gobi. Ala shan is the name of a chain of mountains on the north of the Yellow river, whence this tribe derives its appellation." (Lobscheid, "Typography of China," 86, who doebtless merely compiles from the native "Geography of China under the Ta tsing dynasty.") These mountains apparently extend from 105° to 110° E. long., and from about 39° to perhaps 42° N. lat., in Inner Mongolia, a province the geography of which is very imperfectly known.

† *Lasiagrostis mongolica*, Trin. & Rupr., *alpina*, Fr. Schmidt, *subsessiliflora*, Rupr., and *tremula*, Rupr. (F. Schmidt, Fl. Amguno-bureiensis, 73, t. 1, ff. 6, 7, 8; Osten-Sacken & Rupr., Sertum Tianschanicum, 35).

‡ Species gram. Stipac., 87.

§ Ledb. Fl. Ross. iv., 447. The typical species occurs also in the Rocky Mountains (Watson, Bot. of 40th Paral., 381; Coulter & Porter, Synops. Fl. Colorado, 145).

‖ Nachr. v. d. k. Gesellsch. d. Wiss. a. d. Univ. d. Göttingen, 1868, 82.

¶ *S. orientalis*, Trin., *arabica*, β. *Szovitsiana*, Trin., *breviflora*, Griseb., *Lessingiana*, Trin. & Rupr., *purpurea*, Griseb., *pennata*, Linn.

** *S. sibirica*, Linn., *Bungeana*, Trin., *capillata*, Linn., *consanguinea*, Trin., *Richteriana*, Kar. & Kir.

STIPA INEBRIANS, *sp. nov.*—Rhizomate . . . ., culmis erectis cum vaginis nodisque lævibus, foliis linearibus acuminatis involutis scabris 8 poll. et ultra longis 2-3 lin. latis, ligula lineali truncata, paniculæ linearis coarctatæ angustæ 5-7 poll. longæ pallide viridis lucidæ radiis 2-3 inæqualibus 1-2 poll. longis adpressis a basi v. paulo supra ramosis et floriferis, pedicellis 1-2 lin. longis, glumis subæqualibus lanceolatis apice lacero-dentatis hyalinis nervis 3 viridibus abbreviatis, glumellis adpresse albo-villosis involutis superiore lineari herbacea paulo breviore uninervi inferiore lanceolata subcoriacea 1½ lin. longa trinervi fructifera atrofusca ex apice integro dense barbato aristam articulatam sed persistentem scabram sub anthesi rectiusculam postea distincte tortam et geniculatam 5 lin. longam exserente, antheris linearibus breviter barbatis.

Hab. in montibus Ala shan, Mongoliæ interioris. (Herb. propr. n. 19204.)

I have already quoted Prof. Grisebach's opinion as to the slender grounds on which his *Ptilagrostis* is kept apart from *Stipa*. My own specimens of *Pt. mongolica*, gathered at the river Birjussa in Eastern Siberia by Dr. v. Stubendorff, have a very distinctly twisted awn, which, however, appears to be quite unarticulated. But the recently discovered *Pt. alpina* is evidently technically inseparable from *Lasiagrostis*, whilst the Mongolian plant I have just described, though very different in habit from *L. calamagrostis*, Lk., *L. capensis*, N. ab E., and *L. splendens*, Kth., with each of which I have compared it, yet, by the somewhat less than usually coriaceous lower glumella and the awn almost straight and untwisted of its opening florets (though both these organs attain a little later the normal characters of *Stipa*), seems apparently very close to *L. caragana*, Trin. & Rupr., of which unfortunately I possess no specimen. Indeed, were it not for the "folia perangusta," the lax patulous panicle, smaller flowers, caducous awn, and some other characters of less importance ascribed to that plant, I should have been disposed to consider them identical. I certainly believe that there are no sufficient grounds for separating generically *Stipa* and *Lasiagrostis;* and I should include in the same genus *Macrochloa* and *Aristella*.

SHORT NOTES.

DIATOMS AND WHEAT-STRAW.—Prof. P. B. Wilson, in a short paper in Silliman's "American Journal" for May, states the following. Some land sown in Wheat having been manured with the infusorial earth found in large quantity on the western shore of Chesapeake Bay, the straw, after being treated with nitric acid and the siliceous remains examined under the microscope, was found to consist "wholly of the siliceous shields of Diatomaceæ, the same as found in the infusorial earth, excepting that the larger disks in their perfect form were absent (*Actinocyclus Ehrenberg*[illegible] and *Actinoptychus undulatus*)." . . . "In the particles of silica placed upon the glass slide, when they were completely separated from each other, the outlines of the individual diatoms were sharply and distinctly defined. On the other hand, when the physical action of ebullition with nitric acid was not sufficient for the complete separation of the particles of the epidermal shield, there was observed a marvellous interlacing of the various forms." The author vouches for every precaution having been taken to prevent error; but his assertion that the diatoms had "entered the root capillaries," and were "conveyed by the sap-cells directly to the section of the plant where they were destined to complete its structure," is not very likely to meet with acceptance amongst botanists.

NYMPHÆA FLAVA, *Leitner*.—The plate of Audubon's great work which represents the American Swan likewise represents the flower of a yellow *Nymphæa*, or true Water-lily, under the above name. The foliage which accompanies it may be that of a *Nuphar*, but the flower is that of a *Nymphæa*. Leitner was a German botanist who explored Southern Florida, and died or disappeared there—if we rightly remember, was thought to have been killed by Indians. He doubtless met Audubon, and gave him the name which he published on his plate. The species has properly been left unnoticed so long as the whole evidence of its existence rested upon Audubon's figure of a flower, accompanied as it is with *Nuphar* foliage. But of late years we have heard of a yellow Water-lily in Florida. In 1874 Dr. Edward Palmer sent us a specimen with foliage and flowers collected in Indian River, and certified to the yellow colour. It has now been detected by Mrs. Treat on the St. John's River, and living plants communicated to us, from which we may expect to see fresh blossoms. The growth is very different from that of *N. odorata*, the rhizome being shorter, and thickly beset with salient blunt tubercles; and the plant propagates freely by stolons.—A. GRAY, in *Silliman's Journal*, May, 1876.

GARDENING ON CHEMICAL PRINCIPLES.—Dr. Goeppert, of Breslau, sends the following extract from a paper entitled "Agriculture as a model for Horticulture," read at a meeting of the Silesian "Gesellhaft" last year. "Since the time of Liebig agriculture has been managed in a rational way; for by chemistry the chemical composition of the plant to be cultivated is ascertained, and the soil is selected. But nobody has ever thought of employing chemistry in gardening; there is no instance of a plant reared in gardens or houses ever having been subjected to a chemical analysis, for the purpose of drawing conclusions as to the soil best suited for it. The practice of gardening is at present no less empirical than it was two thousand years ago, in spite of the constant loss of valuable plants. Nobody knows the chemical composition of our tropical *Orchideæ*, *Ericaceæ*, Australian plants, Palms, &c. It is time to put a stop to this state of gardening. It is necessary to analyse the earth in which the plants grow in their native state, and afterwards the plant itself. Thereby we shall be enabled to find out the best soil for each plant. In this manner agriculturists were once, and are still, assisted by chemists: the botanists must also join the chemists, in order to establish a rational method of cultivating plants; which no doubt will turn out to be of great importance to the physiology of plants."

SYMPHYTUM ORIENTALE, *L.*, IN MIDDLESEX.—This conspicuous alien is growing in some quantity on the embankment of the South-Western Railway at Isleworth. It is at once distinguishable from either of the British species of *Symphytum* by the calyx, which is divided hardly more than a quarter of the way down, and by the filaments, which are fully equal to the anthers in length. The pure white flowers, which are produced in considerable abundance, would render it quite worthy of a place in the spring garden, were it not for the probability of its degenerating into a weed, from the rapidity of root-increase. I could obtain no clue to its introduction in the present locality, where I first observed it about the middle of April last; its existence had, however, been known to the railway officials for the past five years, and it appeared to be steadily spreading. I do not altogether think that it had been derived from any neighbouring garden, but rather that owing to some accident it had made its way through the crevices of the station platform, under which a few of the plants were still growing. *Symphytum orientale* is included by Babington in his Manual among those species which "have been noticed in England, but are not natives," but I am not aware that any further particulars as to its occurrence have been anywhere given (cf. Compendium Cyb Brit., p. 548). The "Student's Flora" localises it on "shrubberies only." There is another *Symphytum* with purple flowers which is not very uncommon in old-fashioned gardens, and occurs now and then as an escape in their neighbourhood. This has more than once been recorded in our lists as the *patens* of Sibthorp, but seems to be always of exotic orgin. In Hertfordshire, at all events, the blue or purple-flowered *Symphytum* that occurs occasionally in waste places is altogether indistinguishable from *S. asperrimum*, Sims. The relative length of the anthers and filaments, when examined in a fully developed state, and the large corollas separate it widely from any form of *S. officinale*. *S. asperrimum* has often been recommended for cultivation, and has long been known as an established alien in the vicinity of Bath. Very similar specimens from the same neighbourhood have, however, been named *patens* by a high authority, and Sibthorp himself may possibly have intended something of the same kind.—R. A. PRYOR.

BOTANY OF WORCESTERSHIRE.—At a recent meeting of the Worcestershire Naturalists' Field Club Mr. E. Lees called attention to the researches that had been lately made in the botany of Worcestershire by several of their members, particularly by the Rev. J. H. Thompson and Dr. Fraser. The former observer had found *Brassica Cheiranthus* in considerable plenty on a sandy common near Kidderminster, and also *Rumex maritimus* in great abundance at a neighbouring pond. Both botanists had also noticed hundreds of the littoral plant *Erodium maritimum* in Habberley Valley and adjacent lanes; while the secretary, Mr. Haywood, had brought to the meeting *Doronicum Pardalianches*, which he had gathered near the old bridge at Powick; he had also found some quantity of *Ornithogalum nutans* in an orchard and lane at Hartlebury. Thus their flora by sagacious observation was being added to year after year, and he had therefore determined to print a supplement to the volume of the "Botany of Worcestershire." Mr. Lees then referred to the foreign plants that in some curious way had got into this country, whose immigration ought to be noticed. This very spring Mr. Thompson had conducted him to waste lands and rubbish heaps near Hoo Mill, in the vicinity of Kidderminster, where some quantity of *Alyssum calycinum* was growing, and also the alien plants *Xanthium spinosum*, *Polypogon monspeliensis*, and *Medicago denticulata*.

STELLARIA UMBROSA, *Opitz*.—In May of last year I formed my first practical acquaintance with the form of *Stellaria media* we know as *S. umbrosa*, Opitz, by gathering the plant from a roadside shady bank about halfway betweeen Beeston station and the castle, in Cheshire.* It was growing there in good quantity, and I subsequently found that it was thinly scattered through the surrounding district, retaining in all cases the characteristics as given in Prof. Babington's "Manual," by which it is distinguished from the type. Bearing in mind the statement in the Exchange Club Report for 1871 of this plant reverting to ordinary *S. media* in a single generation, and further that this statement was at variance with the experience of Mr. H. C. Watson as mentioned by him in Comp. Cyb. Brit., I forwarded to Mr. Watson ripe seed, which he sowed, and I quote the result from a letter just received from him: ". . . I sowed some of the seeds, which produced plants, in a small flower-pot. The cluster of young plants was transferred to the open ground. They attained a good size, but produced no flowers until the spring of this year. All are true *umbrosa*, as you will see by the two pieces enclosed herewith in example of them." "Years ago Mr. Edwards found *S. umbrosa* in Kent, and sent me seeds. These were sown and came up true just as yours have done." Mr. Watson further remarks about the Rev. G. S. Streatfeild's record in the Exchange Club Report: "He does not say that he took any special precautions to make sure that no seeds of ordinary *S. media* were in the mould in his 'garden.' It is not easy to obtain garden mould free from Chickweed seed." I presume a specimen of the plant Mr. Streatfeild experimented with was actually sent to the Exchange Club, or from the wording of his note I should have guessed he had mistaken the wood form of *S. media* for *S. umbrosa*.—F. M. WEBB.

Extracts and Abstracts.

OFFICIAL REPORT FOR 1875 OF THE DEPARTMENT OF BOTANY IN THE BRITISH MUSEUM.

By W. CARRUTHERS, F.R.S.

THE work of incorporating plants in the General Herbarium has been actively carried on during the past year. The following collections have been either entirely or in part systematically arranged and inserted in their placs. The large collection of plants bequeathed by the late Rev. R. T. Lowe; the plants of North Africa, collected by Durand; of the Cape of Good Hope, by Zeyher; of Eastern Tropical Africa, by Hildebrandt; of China, by the Rev. James Lamont and F. B. Forbes, Esq.; of the Samoan Islands, by Graeffe; of Chili, by Reed; of Brazil, by Sello; and of Panama, by Seemann.

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* For another Cheshire locality see Journ. Bot., 1871, p. 245.

During the progress of the work of incorporation the following Natural Orders have been greatly increased, and more or less completely re-arranged:—*Ranunculaceæ*, *Cruciferæ*, *Capparideæ*, *Combretaceæ*, *Rosaceæ*, *Myrtaceæ*, *Umbelliferæ*, *Compositæ*, *Gentianaceæ*, *Asclepiadaceæ*, *Verbenaceæ*, *Solanaceæ*, *Polygonaceæ*, and *Gramineæ*.

The following acquisitions deserve special notice:—The portion of the extensive Herbarium of the plants of Madeira and the adjacent islands, formed by the late Rev. R. T. Lowe, and bequeathed by him to the Trustees. This contains a series of the typical plants of Mr. Lowe's "Manual Flora of Madeira."

An extensive selection of plants from the Herbarium of the late Professor Nolte, of Kiel, including a considerable number of plants collected by Forskohl in the East; a complete set of Fries' "Herbarium Normale"; and a number of typical specimens of plants described by Cavanilles, Delile, Thuillier, Allioni, and others.

A large collection of Indian Ferns, made by Lieut.-Colonel Beddome, and employed by him in the preparation of his "Ferns of British India."

A collection of thirteen hundred original drawings of Fungi, made by Mr. W. G. Smith, F.L.S., the great majority of which are finished coloured representations of British species, has been added to the collection of drawings and engravings of plants. The same collection has been increased by the coloured engravings of upwards of 4000 species of Algæ.

The following are the principal additions to the collections of the Department during the year 1875:—

I.—*To the Herbarium.*

General Herbarium.—*Phanerogamia.*—200 species of Sicilian plants, collected and named by Professor Todaro: 255 species of plants from Greece, collected and named by Professor Heldreich: collections made in Iceland and Scandinavia by Isaac Carroll: 200 species of plants from Russia, collected and named by Meinshausen and Golde: 488 species of plants from the Tyrol and North Italy: 1000 species of Scandinavian plants, forming the "Herbarium Normale" of Fries: 1285 species of plants from Schleswig-Holstein, collected and named by Hansen: 73 species of plants from the Oland Islands: a large collection of the species and varieties of *Potamogeton*, *Najas*, and the Batrachian species of *Ranunculus*, named by Nolte: 611 species of plants from Greenland and Iceland: 180 species of plants collected in the East by Forskohl: 254 species of plants, chiefly *Compositæ*, from India, presented by C. B. Clarke, Esq.: 30 species of plants from China, collected and named by Dr. Hance: 100 species of plants frem Hong Kong, and 201 species from Kiukiang, China, presented by F. B. Forbes, Esq.: 411 species of plants from Eastern Tropical Africa, collected by Hildebrandt: 510 species of plants from Southern Africa, collected and named by Professor M'Owan: 82 species of plants from

New England, collected and named by Tuckerman: 773 species of plants from Chili, collected by E. C. Reed.——*Cryptogamia.*—865 species of the Cryptogamic plants of Europe, named by Funk: 100 species of vascular Cryptogams from Germany, named by Professor Reichenbach: herbarium of Indian Ferns, collected by Lieut.-Colonel Beddome: 60 species of Mosses and Hepaticæ, collected in Brazil by Burchell, presented by the Rev. W. A. Leighton: 25 species of Scandinavian Hepaticæ, collected and named by Lindberg and Laekstrom: 50 species of Mosses from Normandy, collected and named by Etienne: 50 species of Hepaticæ, named by Rabenhorst: 50 species of Mosses, named by Rabenhorst: 250 species of Mosses, collected and named by Blandow: 276 species of Mosses from Ceylon, presented by Dr. Thwaites: 988 species of Lichens from Italy, named by Anzi: 100 species of Lichens, named by Rabenhorst: 150 species of Lichens from North America, collected and named by Tuckerman: 667 species of Lichens from New Grenada, being Lindig's "Study Set": 169 species of Lichens from Ceylon, presented by Dr. Thwaites: 200 species of Lichens from Germany, named by Flörke: 200 species of Norrlin's Fennian Lichens, named by Nylander: 25 species of Characeæ, named by Nordstedt: 300 species of Scandinavian Algæ, collected by Areschoug: 200 species of European Algæ, collected by Jurgen: 600 species of Ascomycetous Fungi, collected by Rehm: 500 species of Fungi, collected and named by V. Thuemen: 600 species of Fungi from Germany, collected and named by Fueckel.

British Herbarium.—Phanerogamia. —473 species of plants, chiefly from Buckinghamshire, collected and presented by Miss Chandler: 100 species, forming Don's "Herbarium Britannicum": a large collection of Irish plants, made by Isaac Carroll.——*Cryptogamia.*—A collection of Mosses and Algæ made in Ireland by I. Carroll: a large herbarium of Lichens, formed by the Rev. A. Bloxam: 100 species of Lichens from Wales, collected and named by the Rev. W. A. Leighton: 130 species of Fungi, collected and named by C. B. Plowright.

II.—*To the Fossil Series.*

Seven species of new fossils from the Coal-measures of Belgium, presented by Professor Crépin: a specimen of the cone of *Pinites hexagonus* from the Gault, presented by J. S. Gardner, Esq.: A remarkably fine cone of Lepidodendron, from the Carboniferous rocks near Edinburgh, found by Ch. W. Peach, Esq.: specimens of plants from the Inferior Oolite, collected and presented by Ch. W. Peach, Esq., Edinburgh, and J. W. Bodger, Esq., Peterborough: specimens of Coal-measure plants from West Calder, presented by Messrs. Galletly and Lumsden: 45 specimens of woods from the Red Crag.

The arrangement of the original drawings of British plants by the elder Sowerby, together with the engravings made from them, has been completed. Large additions have been made during the year to the Herbarium of British plants, which has become the most extensive and critically valuable public collection of our native Flora, and is becoming increasingly used by British botanists.

A series of duplicate Mosses from the Arctic regions was, by the authority of the Trustees, prepared and placed in the hands of one of the naturalists to the Arctic Expedition, to guide him in collecting plants during the expedition.

The number of visits paid during the year to the Herbarium for scientific inquiry or research was 1118. The following foreign botanists may be specified as having used the Herbarium in prosecuting their various studies:—Professor Maximowicz, of St. Petersburg, for his monographs of *Rheum* and *Chrysosplenium;* Professor Reichenbach, of Hamburg, for his works on *Orchideæ;* M. De Candolle, of Geneva, for his memoir on the *Meliaceæ;* Count Solms-Laubach, Professor at Strasburg, for his investigations on *Rafflesiaceæ;* Dr. Rostafinski, of Strasburg, for his work on *Fungi;* Professor Crépin, of Brussels, for his investigations on *Rosaceæ*, and on Fossil Plants; and M. Marchal, of Brussels, for his monograph of the *Araliaceæ.* Of British botanists the following may be specified:—Professor Bentley, in connection with the important work on the "Plants employed in Medicine," of which he is joint author with Dr. Trimen, an officer in the Department, and the illustrations of which are for the most part drawn by Mr. Blair from specimens in the Herbarium; Mr. J. Miers, for his monograph of the *Barringtonieæ;* Mr. W. P. Hiern, for the *Rubiaceæ* and *Compositæ* of the "Flora of Tropical Africa"; Mr. George Bentham, for the "Genera Plantarum"; Dr. Braithwaite, for his work on Mosses; Mr. B. D. Jackson, for his investigations into the history of Botany, and into the critical plants of the British Flora; the Rev. J. M. Crombie, for his work on the Lichens of Britain; Mr. J. F. Duthie, for the *Myrtaceæ* of the "Flora of British India"; Mr. T. Howse, for the British Fungi; Mr. E. M. Holmes, for his investigations relating to medicinal plants; Mr. F. M. Webb, for his study of critical British plants; and Mr. R. A. Pryor, for his Flora of Hertfordshire.

Notices of Books.

Genera Plantarum ad exemplaria imprimis in herbariis Kewensibus servata definita; auctoribus G. Bentham et J. D. Hooker. Vol. ii., containing the Gamopetalous Dicotyledons. London: Lovell Reeve. 1873—1876. (pp. 1279.)

The second volume of this great and laborious work has recently been completed by the publication of the second part, containing the remainder of the Gamopetalous Orders, the whole of which are now comprehended in this one volume. The first part was published in April, 1863, and contained the two great Families *Rubiaceæ* and *Compositæ*, and the smaller allied Orders. This second part bears the date "April, 1876" (but does not appear to have been actually published till the middle of May), and besides containing the remaining Gamopetalæ, has also some addenda of recently-published genera, &c., and an index to the whole volume.

The Orders of Gamopetalæ are here forty-five in number, several small ones being reduced to tribes. They are arranged under ten cohorts, grouped into three series; the first with an inferior ovary, the second with the ovary usually superior and the carpels more than two, and the third also with an usually superior ovary, but with two carpels. The Order *Plantagineæ* stands alone at the end of the series as anomalous.

The following is the arrangement of the Orders under these groups:—

Series I. INFERÆ.

Cohors 1. *Rubiales.*

83. Caprifoliaceæ.
84. Rubiaceæ.

Cohors 2. *Asterales.*

85. Valerianeæ.
86. Dipsaceæ.
87. Calycereæ.
88. Compositæ.

Cohors 3. *Campanales.*

89. Stylideæ.
90. Goodenovieæ.
91. Campanulaceæ.

Series II. HETEROMERÆ.

Cohors 4. *Ericales.*

92. Vacciniaceæ.
93. Ericaceæ.
94. Monotropeæ.
95. Epacrideæ.
96. Diapensiaceæ.
97. Lennoaceæ.

Cohors 5. *Primulales.*

98. Plumbagineæ.
99. Primulaceæ.
100. Myrsineæ.

Cohors 6. *Ebenales.*

101. Sapotaceæ.
102. Ebenaceæ.
103. Styraceæ.

Series III. BICARPELLATÆ.

Cohors 7. *Gentianales.*

104. Oleaceæ.
105. Salvadoraceæ.
106. Apocynaceæ.
107. Asclepiadeæ.
108. Loganiaceæ.
109. Gentianeæ.

Cohors 8. *Polemoniales.*

110. Polemoniaceæ.
111. Hydrophyllaceæ.
112. Boragineæ.
113. Convolvulaceæ.
114. Solanaceæ.

Cohors 9. *Personales.*

115. Scrophularineæ.
116. Orobanchaceæ.
117. Lentibularieæ.
118. Columelliaceæ.
119. Gesneraceæ.
120. Bignoniaceæ.
121. Pedalineæ.
122. Acanthaceæ.

Cohors 10. *Lamiales.*

123. Myoporineæ.
124. Selagineæ.
125. Verbenaceæ.
126. Labiatæ.

Ordo anomalus.

127. Plantagineæ.

Notes of some of the points which a quite superficial survey of the volume has presented may be useful. *Lobeliaceæ* becomes a tribe of *Campanulaceæ*, in which Order are also included the genera *Cyphia*, *Nemacladus*, and *Sphenoclea*. There are several new genera in *Vacciniaceæ*, which on account of its inferior ovary is kept distinct from *Ericaceæ*. The curious group of nine monotypic genera forming the wholly parasitic *Monotropeæ* is also maintained as a separate Order; the *Pyroleæ* are placed in *Ericaceæ*. Only a single species of *Calluna* is recognised; the Heaths proper are reckoned at 400. The genus *Monotropa* is restricted to the Himalayan and American *M. uniflora*, our British species being the type of the genus *Hypopithys* (*H. multiflora*, Scop.), which is maintained. We find three new genera in the *Myrsineæ*, two Andean and one from New Caledonia.

Sapotaceæ have presented great difficulties; twenty-four genera are given (four being now characterised for the first time), but many are still badly limited, owing to the seeds of numerous species being still unknown. The Gutta-Percha, *Isonandra Gutta*, Hook., is in this case; it is here placed under the genus *Dichopsis*, Thwaites. In the *Ebenaceæ* Mr. Hiern's excellent monograph has been followed; *Brachynema*, however, discarded from the Order by that author, is here still (doubtfully) retained in it. The *Jasmineæ* and *Oleaceæ* form a single Order. *Phlyarodoxa* (see J. Bot., 1875, p. 229) is thought to be a species of *Ligustrum*. The anomalous genera *Gelsemium* and *Desfontainesia* are both accommodated in the *Loganiaceæ*, where we also find *Buddleia* and some other genera formerly placed in *Scrophulariaceæ*. In the *Gentianeæ* we notice that the two species (one from Guernsey) found in British books under *Cicendia* are here widely separated, *C. pusilla* (*C. Candollei*) being retained in that genus, now restricted to a single species, whilst the common English species, *C. filiformis*, becomes *Microcala filiformis* of Hoffmansegg and Link.

The species of *Boragineæ* are estimated at 1200, the *Cordieæ* and *Ehretieæ* being included; it may be noted that Dr. A. Gray has already published his new genera *Harpagonella* and *Echidiocarya* in the part of his "Botanical Contributions" dated January 5th, 1876. In *Convolvulaceæ* nearly half of the species are now included in one great genus *Ipomæa*, into which are merged *Exogonium*, *Pharbitis*, &c. *Nolana* and its allies are included in this Order. The *Solanaceæ* have been considerally remodelled from the form in which they were left after the laborious investigations of Dunal and Miers. Over 1800 species have been published, which the authors of the "Genera" would reduce to 1250, arranged in sixty-seven genera, under five tribes, the last of which is the *Salpiglossidæ*, consisting mainly of genera placed by Bentham as a tribe of the *Scrophulariaceæ* in his monograph in DC. Prod., vol. x. (1846). A few of Mr. Miers' and Dunal's genera have been reduced to others, but, on the other hand, some sections of Dunal have been promoted to generic rank (*Physochlaina*, *Cacabus*). *Solanum* is still credited with at least 700 species, and no better mode of grouping them is suggested than into Dunal's two sections; it is remarked that a monograph by a competent botanist is much wanted. *Verbasceæ* is retained in *Scrophulariaceæ*, which has 1900 species under 158 genera. *Orobanchaceæ* one is a little surprised to find kept distinct. There are as many as seven new (unpublished) genera among the *Gesneraceæ* (in which *Cyrtandreæ* are included); and some fourteen or fifteen in the large Order *Acanthaceæ*. In the vast family of *Labiatæ* Mr. Bentham may be considered to be especially versed; the 136 genera, containing 2600 species, are here grouped under eight tribes, the monograph contained in the "Prodromus" being followed with but very little change; *Salvia* is credited with 450 species.

There is one omission in the "Genera Plantarum": the authors do not give the date of publication of the genus-names they adopt. To have added these dates would have occupied a quite inconsiderable space, and would have saved a good deal of trouble to those working with the book. Considerable difference of opinion, it is true, prevails among botanists as to the origin of the definition of genera in the modern sense; some writers even quote the classical authors as authorities for genera now in scientific use, and many go back at least to Tournefort and Micheli. Without entering here into the merits of this question, it is sufficient to call attention to the practice of the present authors, who draw the line at the period of Linnæus. This would make their starting-point the publication of the "Systema Naturæ," in which Linnæus first gave the names of his genera. We do not, however, find this book (1735) actually quoted by the authors, who are usually content to give merely the number of the genus in "Linn. Gen." But as no less than six editions of this book were issued during the life of its author—the first dated 1737—it would appear quite necessary to quote in each case the edition referred to.

Between 1735 and 1778 (the date of Linnæus's death) a large number of local systematic Floras and memoirs arranged on the Linnæan principles were printed, and to the new genera published in these the ordinary rules of scientific priority should be applied in relation to the Linnæan ones. It is probable that a systematic examination of these would result in several alterations in genus-nomenclature. Take the following, referring to a British plant, as an example. In 1762 our countryman, Hudson, founded the genus *Blackstonia* (Flora Anglica, ed. i., p. 146) for our yellow Centaury, the *Gentiana perfoliata* of Linnæus. Five years later, in 1767, Linnæus himself (Mantissa i., p. 10, and Syst. Nat., ed. xii., p. 267) also made the plant a genus, and took up Reneaulme's name, published in 1611. Of course, if we are to recognise such ancient names as truly generic in the modern sense, *Blackstonia*, Hudson, must yield to *Chlora*, Reneaulme; but to take up the name "*Chlora*, Linn.," as is done in the "Genera Plantarum," p. 809, must be incorrect in the face of the earlier name of Hudson.

For the history of generic names we are fortunate in possessing such a book as the extremely careful and complete "Nomenclator Botanicus" of Dr. Pfeiffer, which commences with Tournefort (1700) and extends to the end of 1858 only. It very usefully supplements the "Genera Plantarum" in the latter's weak point, and the two together give nearly all the information about genera that we can want.

H. T.

Botanical News.

ARTICLES IN JOURNALS.—MAY.

Botanische Zeitung.—W. Velten, "On true plant-electricity."—P. Ascherson, "On *Galium pedemontanum.*"—Id., "Further remarks on Malaguetta- or Melegueta-pepper.'

Hedwigia. — O. Nordstedt, "Remarks on the Desmidieæ in Reinsch's 'Contrib. ad Algol. et Fungol.' "—H. F. Bonorden, "Mycology" (contd.).

Flora.—W. Velten, "Influence of temperature on protoplasm-movements" (contd.).—N. W. P. Rauwenhoff, "Is horny-prosenchyma a special form of plant-tissue?"—A. de Krempelhuber, "Lichenes brasilienses" (contd.).—C. Luerssen, "Vascular Cryptogams collected by Wawra in the voyage of the *Donau.*"—W. Nylander, "Addenda nova ad Lichen. Europ. (incl. 15 new species coll. by Larbalestier in Ireland and Jersey)."

Œsterr. Bot. Zeitschr.—W. Vatke, "Plants collected in Africa by Hildebrandt; *Asclepiadeæ.*"—J. L. Holuby, "Mints of the S. Trencsiner district."—F. Hauck, "*Oscillaria caldariorum*, n.s."—J. Wiesbaur, "Austrian forms of *Scleranthus.*"—S. Schultzer v. Muggenburg, "Mycological notes."—J. Freyn, "On some plants chiefly of the Austro-Hungarian flora" (contd.).—J. Kugy, "Excursion through Oberkrain."—F. Antoine, "Botany of the Vienna Exhibition" (contd.).

Journ. Linn Soc. Lond. (n. 83, May 11.).—D. Oliver, "Enumeration of plants coll. by V. L. Cameron about Lake Tanganyika" (13 n. sp. described).—Id., "Notes on a collection of North Celebes plants made by Mr. Riedel, of Gorontalo" (9 n. sp. described).—G. King, "On a sport in *Paritium tricuspe*, G. Don."—J. G. Baker, "Polynesian Ferns of the *Challenger* Expedition" (11 n. sp. described).—H. G. Reichenbach and D. Oliver, "Orchids collected at Admiralty Is., Ternate, and Cape York, on the *Challenger* Expedition."—C. B. Clarke, "On *Edgaria*, a new genus of *Cucurbitaceæ.*"—Id., "Botanic notes from Darjeeling to Tonglo" (*Warea*, gen. nov., and *Rampinia*, gen. nov., Cucurbitacearum).

American Naturalist.—A. Gray, "On Wild Gooseberries" (synopsis of N. American *Ribes*).—W. G. Farlow, "University Education in Botany."

Botaniska Notiser (15th May).—J. E. Areschoug, "De tribus *Laminarieis* et de *Stephanocystide osmundacea* observationes præcursores" (*Eisenia*, gen. nov.).—E. Hisinger, "*Œcidium conorum-abietis* in Finland."—Id., "*Peridermum Pini*, killing *Pinus Strobus.*"—A. Lundström, "On *Salix finmarkica*, Fries."

New Books.—E. Strasburger, "Sur la formation et la division des cellules." Translated into French by J. J. Kickx (Jena, 1876, 16mk., with 8 plates.)—Kny, "Wandtafeln," pt. 2, tab. 11-20. (Berlin 24mk.)

The last part of Baillon's "Histoire des Plantes" contains the Orders *Castaneaceæ*, *Combretaceæ* (in which are placed *Nyssa*, *Alangium*, and *Marlea*), and *Rhizophoreæ*.

The "Nederlandsch Kruidkundig Archief" for 1875-6 contains, amongst other contributions, papers by Oudemans on the Fungi of Holland (with 2 plates), by Burck on the development of the indusium in Ferns (2 plates), and a supplement to the list of plants of the dunes of the Netherlands, which was reprinted in this Journal for 1875, pp. 142-154.

The third part of Blytt's "Norges Flora" (Flora of Norway) has lately appeared, and completes the book, with the exception of a supplement to the first part, printed so long ago as 1861, and the index. It contains the whole of the Polypetalæ, and appears to be worked up with equal care to that bestowed on previous portions of the book.* The *Rubi* are contributed by F. W. C. Areschoug.

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* For a notice of previous part, see Journ. Bot., 1874, p. 281.

The "Academy" states that Messrs. Godman and Salvin have entrusted Mr. W. B. Hemsley with the compilation of a catalogue of all known plants of Central America in herbaria and books. The enumeration will cite collectors' names and numbers, and references to descriptions and figures.

Baron von Ettingshausen is, we believe, to undertake the determination and description of the Eocene plants of the South of England, which have never been sufficiently examined. J. S. Gardner, Esq., F.G.S., who has a very extensive collection of these plants, will be associated with him in this work, and it is intended to proceed with it without delay. The Baron is specially fitted, by his acquaintance with deposits of similar age abroad, to carry this work to a satisfactory issue, and to supply from his extensive knowledge the means of accurately intercalating the plants in their proper position in already known fossil floras.

Dr. William Nylander, the distinguished lichenologist, has been elected a foreign member of the Linnean Society of London.

Charles des Moulins, President of the Société Linnéenne of Bordeaux, died last December. He was the author of a "Catalogue raisonné des Phanérogames de la Dordogne," published in 1840, in which are many valuable notes on structural characters of critical species, as well as of several other botanical memoirs, including one on scientific nomenclature printed in 1854. In his later life he was chiefly occupied with geology and zoology.

Edward Newman, who died at Peckham on June 12th, at the age of seventy-five, was better known as a zoologist than a botanist, but may be regarded as one of the "all-round" naturalists, a class which is now nearly extinct. He was a native of Godalming, in Surrey, and some of his earliest papers were on the natural history of that place, printed in the "Magazine of Natural History." These were afterwards published separately, under the title of "Letters of Rusticus," and though their authorship was never publicly acknowledged, it is believed they are correctly referred to Mr. Newman. His works and papers on Entomology are very numerous, 131 articles, mostly relating to that department of science, standing under his name in the Royal Society's Catalogue. The "Zoologist," which magazine was started in 1843, has continued till now, and is a vast storehouse of facts. The botanical reputation of Newman rests chiefly on his "History of British Ferns," of which the first edition appeared in 1840, the second in 1844, the third in 1854, and a fourth so lately as 1865. This was, at the time of its first appearance, very much the best book on the subject, and is an original and accurate treatise. In June, 1841, the "Phytologist," a monthly magazine devoted to Botany, especially to all relating to British plants, was started, and was conducted with great spirit and success for some years. In the editorial work Mr. Newman had the assistance of George Luxford, a very good writer and botanist, who generally wrote the anonymous articles; the annual prefaces, which often extend to some length, and give a useful summary of the work of the past year, being always the work of Newman. From his position as a printer, he was able to carry on this venture with as little expenditure as possible, but it was never successful commercially, and on the death of Luxford in June, 1854, it came suddenly to an end. But the thanks of British botanists are due to the editor for the possession of this valuable repertory of the progress of their department for thirteen years. Probably few have done more to render genuine natural history in its various branches popular than the late Edward Newman.

We have also to record the death of W. G. McIvor, of Ootacamund, whose services in the introduction of *Cinchona* plants into the Neilgherry Hills in 1861, and successful cultivation of the now immense plantations, have been most important to the world. He published in 1847 a pocket herbarium of British Hepaticæ. We may take this opportunity of correcting an inadvertency at p. 160, where it is stated erroneously that Mr. McIvor held the directorship of the Saharunpore Gardens.

At the anniversary meeting of the Linnean Society, held 24th May, there were presented, on behalf of the widow of the late J. J. Bennett, three memorial medals of Linnæus—one of silver, struck in 1746, given by Linnæus to Haller in exchange for his portrait; one of gold dated 1747, struck at the expense of Count Tessin; and a large silver one, designed by Lynberger and struck by command of the King of Sweden in commemoration of Linnæus's death, 10th of January, 1778.

Dr. B. A. Gomes, of Lisbon, gives in the "Jornal de Sciencias" of that city (no. 19) a very full history (pp. 28) of the relationship of the late Dr. Welwitsch to the Portuguese Government, and of the lately terminated litigation in reference to his collections. It is written in English, and though of course the question is viewed from the Portuguese standpoint, and the account necessarily one-sided, gives much interesting detail not previously made public, especially with regard to the various efforts at compromise persistently made by the executors. Now that the matter is settled in terms which, as Dr. Gomes says, are "satisfactory to all," it is curious to mark that those terms are in every respect, with a trifling exception, precisely the same as those of the first compromise offered by the executors in 1873 and then rejected by the Government with some scorn. It is only right to mention here that there are a few statements made which are opposed to facts well known; these, that Dr. Welwitsch made his will "in his last moments," having fallen "a victim to some surprise," and "not being completely conscious of what he subscribed," and that the "higher administration of the British Museum" is far from having approved of the "manœuvres" of the executors, are all completely untrue and should be publicly contradicted.

The existence in London of a free public library of botanical and horticultural books is probably unknown to many, but the Lindley Library deposited in the rooms of the Royal Horticultural Society at South Kensington is open to all persons, and under certain restrictions books may be borrowed. In a circular recently issued attention is called to these advantages, and to the impossibility, owing to the scanty annual income (£38) of the library, of keeping up to date in current books and periodicals. We gladly give further publicity to these facts, and hope that anyone able to do so will help to complete the library, by contributions of books, &c., which may be sent to the librarian, Mr. W. B. Hemsley.

Original Articles.

ON CERTAIN SMALL-FRUITED PEARS.

By Maxwell T. Masters, M.D., F.R.S.

(Tab. 180.)

In the Report of the Curator of the Botanical Exchange Club dated April 1871, and reprinted in this Journal, 1871, p. 182, Dr. Boswell-Syme describes an interesting variety of *Pyrus communis*, for which he proposes the name of *P. communis*, var. *Briggsii*. In a subsequent number (Journ. of Bot. 1871, p. 214) Mr. Briggs, who originally discovered the variety in a hedge near Plymouth gave some additional particulars relating to it.

My own attention was drawn to this form from the circumstance that the eminent archæologist, Dr. Phené, sought my assistance in the determination of a small-fruited Pyrus which he had found in Brittany. This I had no difficulty in identifying with the *Pyrus cordata* of Desvaux (Obs. Pl. Anjou (1818), p. 152), a species well figured and described in Decaisne's "Jardin Fruitier du Muséum" (Poirier), vol. i., p. 330, tab. 3. M. Durieu de Maisonneuve, overlooking the earlier publication of Desvaux, described the same plant under the name *Pyrus communis azarolifera*, Bull. Soc. Bot. France v. (1858), p. 726, vi., 621, and vii., p. 31.

According to Decaisne, l.c., the form just mentioned, which is found in Anjou and in Brittany, is the same with a species found in North-East Persia, on Mount Elbruz, by Buhse, and elsewhere in the same region by other collectors. The Persian form was originally called *P. Boissierana* by Buhse (Aufzaehl. Transkaukas. et Pers. gesamm. Pflanz., 87), but it is described under the name *P. cordata*, Desv., in Boissier's "Flora Orientalis," vol. ii., 1872, p. 653. The Plymouth plant does not appear to be quite the same as the French or Persian specimens, but it is so similar that no one who knows how greatly the foliage, flowers, and fruits of Pears and Apples sometimes differ even on the same individual tree, and how much variation is observed in seedlings from the same tree or the same fruit, could doubt the possibility that the one form might be a seedling variation from the other. This is not susceptible of direct proof, but I believe that when the reader is put into possession of the facts of the case, as at present known, he will not be likely to accuse me of any great amount of rashness if I assume that the Persian, the Western French, and the Devonshire specimens are specifically identical, or at least derived from the same stock. This assumption is borne out by the singular history attaching to the Brittany plant. It is fair to say, however, that I had arrived at my conclusions from the botanical characters before I was fully aware of the archæological evidence that might be brought forward in its support.

We have, then, to consider three forms very nearly alike occurring in Persia, Central and Western France, and in one of our own south-western counties, and we have to consider the probabilities of a migration or transportation from one country to the others, and the means whereby it may have been effected.

And first of the Plymouth form. Of this I have seen the type specimens in the Herbarium of the British Museum. The specimens are good, and show a sterile shoot with its foliage, a flowering-shoot, and others bearing fruits. In addition I have, of course, consulted what Dr. Boswell-Syme and Mr. Briggs have already published (loc. cit.) On the barren branch the shoots terminate in spines, which are very slender, purplish, and glabrescent. The leaves measure about 1½ by 1 inch, and are supported on a setose stalk of about ¼ inch in length. The blade of the leaf is ovate-lanceolate, acuminate, rounded at base, crenulate-dentate, glabrescent on the surface generally, but thinly and shortly setose along the midrib on the upper surface and along the margins. The stipules are caducous, linear-setaceous, about a third shorter than the petioles. The leaf-buds are short, oblong, obtuse, and glabrous. On the flowering-shoot the leaves are of a more oblong obtuse form, shortly and abruptly deltoid-acuminate at the apex and subcordate at the base. The flowers are numerous, arranged in an elongate corymb, the rachis of which, as observed by Dr. Boswell-Syme, has a marked tendency to lengthen out. Each flower measures about ¾ inch across, and is supported on a pedicel about 1¼ inch in length, rather densely covered, like the calyx, with brown, shaggy pubescence. The flower-tube (calyx-tube) is inversely pyramidal, giving off from its margin 5 deltoid-acuminate sepals, half the length of the oblong, obovate, obtuse, shortly unguiculate petals. The claw of the petal is sparingly ciliate; the filaments and styles (the latter free to the base) are glabrous. The fruits measure about ⅜ in. in length, by about ¼ inch at the greatest width; they are pyriform or turbinate, rounded and obtuse at the distal end, gradually tapering at the base into the pedicel. The surface of the fruit is glabrous, brown, speckled with white spots. The calyx segments are deciduous, and leave a circular scar round the small shallow circular "eye" of the fruit.

Mr. Briggs states that he has only found the plant in question in three or four spots in one hedgerow away from houses, though he does not regard it or any other form of *P. communis* (growing about Plymouth) as indigenous. He further remarks that the plant is more shrubby and Crab-like in appearance than are most of the examples of the so-called wild Pear met with about Plymouth. Very noteworthy is the circumstance, also alluded to by Mr. Briggs, that the plant in question, flowers late (at the beginning of May), corresponding as to this, not with our Pears generally, which are in blossom quite a fortnight or three weeks before, but with the Apple and Crab.

Turning now to the consideration of the French specimens, of which good examples exist in the Kew Herbarium, from Gay's Herbarium and other sources, it may be well to cite the description given by Decaisne, as that occurs in a work not very accessible to the majority of purely botanical readers. M. Decaisne's description runs as follows: "*Pirus** *cordata*, Desv. Frutex vel arbuscula diffusa ramosa spinosa, cortice cinereo-rimoso; ramulis annotinis gracilibus glabriusculis; foliis cordatis vel ovato-cordatis acuminatis dentatis v. integris interdum circinnatis mucronulatis, junioribus ciliatis, adultis glaberrimis supra nitidis; petiolis gracilibus primo pube subfusca inspersis dein glabratis, stipulis setaceis; corymbis plurifloris florumque pedicellis pubescenti-tomentosis; floribus parvis, fructibus sæpius fasciculatis parvis rotundis magnitudine pisi majoris vel Cerasi avii, calyce deciduo v. persistente longe pedunculatis fuscis albo-punctatis." (Decaisne, loc. cit.)

The Pear now in question is stated by Desvaux to be "*assez commun*" in Anjou; its fruits are described as of the same size as the berries or pomes of the Hawthorn. In Haute-Bretagne, according to the same authority, it bears the name of *Poirasse*, to distinguish it from the "Poirillonier," or wild Pear, which is the *P. sylvestris* of authors, and which has oblong leaves.

Decaisne adds that these wild Pears (*P. cordata*) are known in Brittany under the name of Besi or Bezizolles, and their young stems are used for walking-canes and whip-handles.

By Durieu de Maisonneuve, as we have already seen, the plant was found in the Gironde, near Canau, and in marshy places near Bordeaux. He describes it, under the name of *P. communis*, var. *azarolifera*, as a bush of about the height of a man, with tortuous, very spiny branches. But it is, he says, especially remarkable for the extreme smallness of its fruits and their depressed globular form, which are extremely rough to the taste, and undergo a kind of "bletting," as in the case of Sorbs and Medlars. The fruits ripen early in August. Everything points to the conclusion, says M. Durieu, that this is the original stock of certain cultivated Pears distinguished by their precocity and their Apple-like fruits.

The chief differences between the French and the Plymouth specimens consist, therefore, in the leaves, which are in the French specimens almost suborbicular and subcordate, while the fruits are, though of much the same size and speckled appearance, globose in the French, turbinate in the Devonshire plant. The period of flowering and ripening of the fruit present some differences in the two plants. Mr. Briggs notes the flowering as "late," *i.e.*, at the beginning of May. His fruits, however, were gathered on the 13th of August (British Museum specimen), so that, making allowance for difference of climate, there does not seem to be any very great discrepancy as to this point between the French and the English specimens.

Thirdly, we may cite Buhse's description of his *P. Boissierana*, as that, too, is not likely to be readily accessible to the majority of British botanists. "P. fruticosa, cortice nigricante lævi glabro; foliis adultis glabris, petiolo gracili limbo plerumque longiori suffultis e basi rotundato sub-cuneato ovato-rotundis obtusis v. breviter acuminatis, circumcirca minute serrulatis supra nitidis subtus pallidioribus; floribus — ; fructibus corymboso-umbellatis pedunculis eis subduplo longioribus rubellis glabris suffultis exacte globosis rubellis nitidis punctulatis laciniis calycinis demum deciduis. Foliorum limbus longiorum 12-18 lineas longus. Pyridia ceraso vix majora, *Buhse* l.c." Boissier describes the same plant thus: "Frutex vel arbor parva, gemmis glabriusculis; foliis ovato-orbicularibus minute serrulatis junioribus ciliatis adultis glaberrimis, petiolo tenui sub-brevioribus; corymbis simplicibus; petalis parvis orbiculatis; pedunculis fructiferis fasciculatis gracilibus; fructu minuto globoso subduplo longioribus."

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* M. Decaisne uniformly adopts the correct classical spelling of the word, but for the present purpose I have considered it best not to depart from conventional usage.

It will thus be seen that, judging from the description, the Persian plant and the French one resemble one another more closely than they do the Devonshire plant. Apart from the foliage the petals of the Persian plant are described by Boissier as orbiculate, which they are certainly not in the Devonshire plant. The fruit in the Persian form is described in one case as scarcely larger than a Cherry—by Boissier as "magnitudine Cerasi." The word Cherry (Cerasus) is rather a vague indication as to size. Decaisne, as we have said, compares the fruit of the French plant to a large Pea or to the fruits of the Bird-cherry (*Cerasus Avium*), and the specimens I have seen conform to this standard, as do also the Plymouth fruits. It would hence seem as if the Persian fruits were rather larger than those of the French or of the English forms. As to the time of fruiting, Boissier says it is in "ultimis Septembri diebus maturans." This difference may be dependent on difference of climate, for Boissier adds: "Valde singulare est hanc speciem in Gallia occidentali et, ut videtur, spontanée occurrere, specimina ex agro Andegavensi præter pedunculos et petiolos juniores magis tomentosos Persicis quoad folia et fructus similia videntur."

This leads us to the consideration of how a Persian plant comes to be found in Western France—and possibly in Devonshire also. It is worth mention in the first instance that Prof. Karl Koch, who travelled for four years in the Caucasus and Persia, considers that the present races of Pear-trees originated from three different species—*P. persica*, Desv., with its numerous synonyms, and from which the Bergamots and Rousselets have descended; 2. *P. eleagrifolia*, a native of Caucasus; and 3. *P. sinensis* or its wild representative, which may be identical with Maximowicz's *P. ussuriensis*.*

Decaisne, in the work previously cited, looks on the principal species of Pyrus as having been, under the influence of cultivation, the parents of certain secondary forms which were the progenitors of our present varieties. All the cultivated Pear-trees are supposed by him to belong to one species, which has become subdivided into six races. 1. The Celtic race, including *P. cordata*, Desv. 2. The Germanic race, including *P. communis*, *P. Achras*, and *P. Piraster*. 3. The Hellenic race, including *P. parviflora*, Desf., *P. sinaica*, Thouin, and others. 4. The Pontic race, including *P. eleagrifolia*, Pall., and others. 5. The Indian race, comprising *P. Paschæ*, Don., etc.; and 6. The Mongolic race, of which *P. sinensis*, Lindl. (= *P. ussuriensis*, Maximowicz) is the type. We cannot pursue this part of the subject, but must simply refer the reader to M. Decaisne's book for further information.

As to the Celtic race, to which the Persian, French, and Devonshire forms belong, Dr. Phené's remarks are of the greatest interest, and we may therefore cite in this place the following passages, embodying

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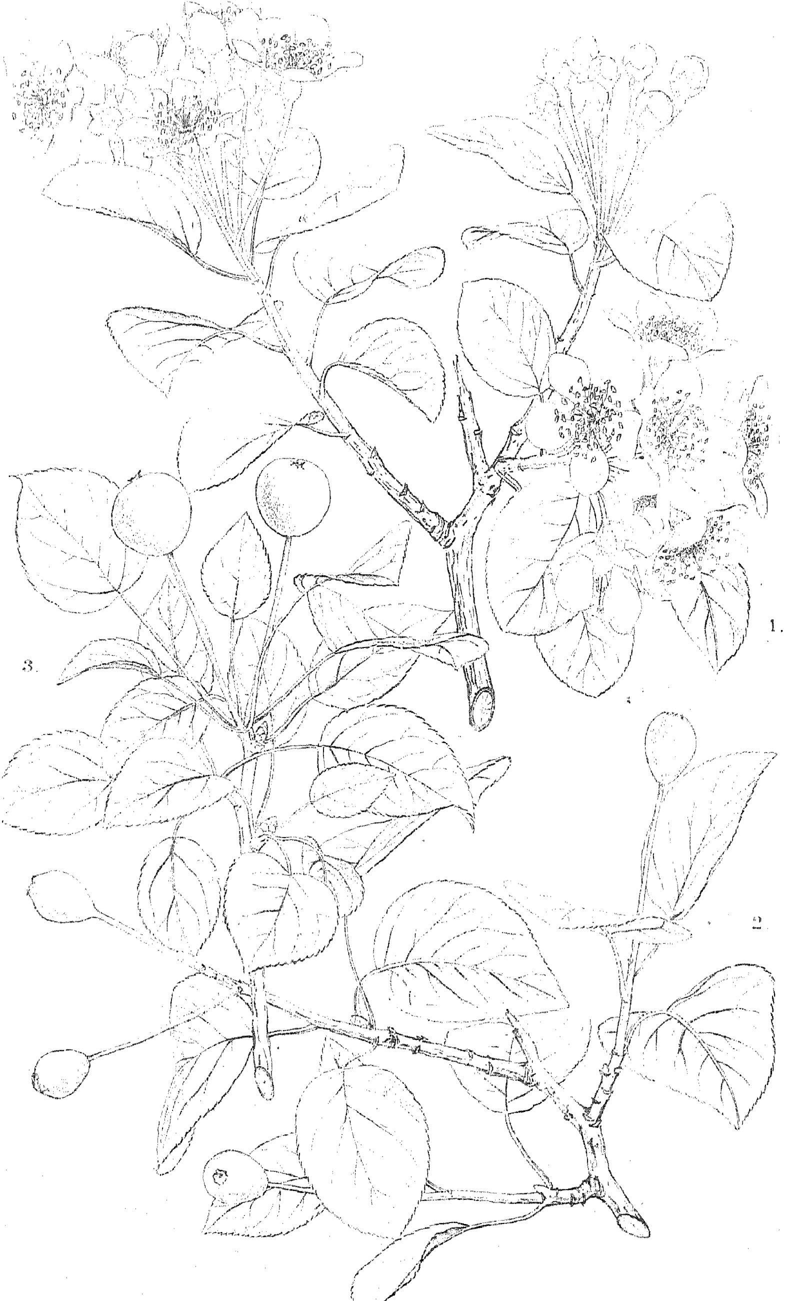
* See "Gardeners' Chronicle," March 21, 1874, p. 382.



D. Blair F.L.S. del. et lith.

Mintern Bros imp.

1 & 2. Pyrus communis L. var.

his views, and which were originally published in the "Gardeners' Chronicle," November 27, 1875, p. 684.

"Dr. Phené visited Brittany, to trace practically any connection —if such could be found—between the legends which connect the 'Isle of Apples' of Arthurian repute with that locality, and those which connect it with Britain. King Arthur, it appears, is supposed to have been buried either in the Island of Avalon (Glastonbury), in England, or in that of Aiguillon in Armorica, the equivalent of Isle of Avalon being Isle of Apples. An island in Loch Awe, in Argyllshire, has a Celtic legend containing the principal features of Arthurian story, but in this case the word is 'berries' instead of apples. These particulars were fully given in a paper read on June 10, 1875, by Dr. Phené before the Royal Historical Society, in which he expressed a belief that the legend of the mystical Arthur was derived from the character of Arjuna given in the Indian poem, "Máhá Bárata." After closely examining the island in Loch Awe, and Avalon in Somersetshire, he concluded his researches by a visit to Armorica, Brittany. He there observed a tree which helped him to the apples of Avalon and the berries of Loch Awe, for the apples on the tree were berries. The specimen he has submitted to us is the *Pirus cordata* of Desvaux, and it is interesting to note, in support of Dr. Phené's argument, that it has been found in Western France—perhaps in South-western England, if the plant found by Mr. Briggs near Plymouth, and called by Dr. Boswell-Syme 'Pyrus communis, var. Briggsii,' be the same—and nowhere else in Europe. Both countries had their western shores occupied, anterior to the invasion of the Cymry, by a peculiar race of people having strong Oriental characteristics, and which people some authors describe as occupying the country as far north as Argyllshire—the evidences of such occupation having been laid before the British Association at Bristol in September, 1875, in Dr. Phené's paper on that subject—while the same tree is found on Mount Elbruz in North-east Persia—a country not remote from that which formed the arena of Arjuna's exploits, and whence it would seem to have been imported to the west of Europe.

"The geographical distribution of *P. cordata* in Persia and in Western Europe was inexplicable, but now seems to be reasonably accounted for."

It may be well to add that the plant labelled *P. cordata*, Desv., in Billot's "Exsiccata, No. 2458 (Herb. Mus. Brit.), is decidedly different from the true plant of Desvaux, Decaisne, Durieu, Boissier, and Buhse. It differs in the larger size of all its parts, in its more persistent sepals, and its fruits, which are broadest below, tapering upward into a kind of neck, a form which in an Apple would be recognised by pomologists as Pearmain-shaped.

Lastly, it may be stated that none of the forms of half-wild Pears described and figured by Mr. Wilson Saunders in the Journal of the Royal Horticultural Society, 1872, p. 95, are at all like either of the small-fruited forms mentioned in this paper.

Description of Tab. 180.

Figs. 1 and 2. *Pyrus communis*, L., var. *Briggsii*, from specimens in the British Museum collected at Egg Buckland, S. Devon, by Mr. T. R. Archer Briggs. 3. *Pyrus cordata*, Desv. From a specimen in the Kew Herbarium (Herb. J. Gay) collected in the Gironde, France.

ON *ANOMOCLADA*, A NEW GENUS OF HEPATICÆ, AND ON ITS ALLIED GENERA, *ODONTOSCHISMA* AND *ADELANTHUS*.

By Richard Spruce, Ph.D., F.R.G.S., &c.

(Tab. 178, 179.)

(*Concluded from p.* 203.)

I proceed to offer a character of the subgenus *Jamesoniella*, followed by a full description of *J. Carringtoni*, and of the only other two species I possess in good state for comparison with it.

Jamesoniella, Spruce (*Jungermanniæ* subgenus).

Plantæ elatæ, speciosæ, cæspitosæ, roseæ pallidæve. *Caules* sæpe suberecti, parce fastigiatimque ramosi, *flagelliferi*, *apice* pro more circinato *indefinite crescentes; rami* postico-laterales. *Folia* magna alterna succuba lateraliter appressa (*accumbentia*), pro more basi obliqua insigniter decurrentia, *valde concava*, integerrima v. parcissime ciliata v. denticulata. *Cellulæ* parvulæ v. fere minutæ, subpellucidæ, ad angulos *pulchre incrassatæ*. *Foliola* nulla, v. perrara minutaque, nisi ad involucrum. *Flores* dioici: ♂ terminales, *innovatione suffulti; bracteæ bracteolaque interjecta plurilaciniatæ*. *Perianthium* plus minus emersum, apicem versus 6-10-*plicatum*, ore parum denticulatum. *Capsula*, etc., haud visa. *Flores* ♂ cauligeni, sæpissime terminales; *bracteæ* foliis consecutivæ 2-3-andræ.

1. Jungermannia (Jamesoniella) Carringtoni (*Balf.*).

Adelanthus Carringtoni, Balf. MSS., Carringt. in Trans. Bot. Soc. Edinb., 1870, p. 378; *Nardia C.*, Ejusd. Brit. Hep., p. 27 (sine tempore ascripto); *Nardia compressa*, var γ, Lindberg in "Hep. Hibern." in Act. Soc. Sc. Fenn., 1875.

Hab. in montibus Scoticis, ubi primus omnium (uti videatur) cel. Greville legit, circiter a. 1830, mecum aliisque sub nom. "Jungermannia compressa" communicavit; cl. Dr. J. Stirton tamen, a. 1866, primum bene distinxit et pro specie propria salutavit.

Folia 1·1 × 1·6, f. basis decurrens ·5; cellulæ $\frac{1}{60}$mm.

Elata, cæspitosa, pallida, virescens vel (in sicco) substraminea nitida. *Caules* 3-4-pollicares, e basi brevi subnuda flagellifera erecti, validi, flexuosi, polyphylli, apice plus minus circinato indefinite crescentes, subsimplices vel parce et subfastigiatim ramosi. *Rami* foliosi assurgentes, radicellosi (flagella) devexi; omnes rami e foliorum axilla intra angulum posticum—nec unquam e caulis facie postica extra foliorum bases—orti, ex quo "postico-laterales" appellandi. *Radicellæ* pallidæ tenues fasciculatæ, ad flagella subaphylla, necnon (sed rarius) ad caulem inferiorem pone foliorum basin adveniunt.

Folia caulis ramorumque *infima minuta* dissita subrotunda cuneatave, 2-3-*ciliato-fida*; sequuntur pauca sensim submajora *inciso-spinosa* (spinis sub 5, sæpe ciliiformibus) foliis *Lophocoleæ columbicæ* haud absimilia; posthæc folia normalia majuscula, laxiuscule imbricata, lateraliter sese accumbentia appressaque, *toto margine cum contrariis conniventi-subcontigua*, insertione transversa, *oblique*

reniformi-orbiculata, *valde concava* margineque antico præcipue late incurva, *basi antica longe sensim decurrentia*, *postica valde semicordato-ampliata* abrupte angustissime decurrentia, *medio margine postico* 1-*ciliata*, *vel dentato*-2-6-*ciliata*, cæterum integerrima, sæpe omnino inermia. *Cellulæ* minutulæ, subconformes, æquilateræ, subpellucidæ, sublævissimæ, ad angulos incrassatæ, trigonis conspicuis, endochromio parco.

Foliola adveniunt caulis apicem versus et ad ramos novellos: præminuta, sublinearia, caule multo angustiora, appressa, ad medium usque inæqualiter bifida, laciniis subulatis.

Andrœcia caulis ramive apicem—raro medium—tenentia, spicata; *bracteæ* 6-10-jugæ foliis caulinis consecutivæ, perpaulo minores, turgidæ, antice lobulo angusto incubo in folium sensim transeunte, nec in dentem apice protracto, auctæ. *Antheridia* haud inveni: sec. cl. Carrington 2-3-na sunt.

Forma foliis omnibus (infimis ramorum minutis subincisis exceptis) integerrimis legit cl. C. Howie supra Ben Each, Co. Ross.

The leaves overlap the stem considerably on both sides, a little more on the under than the upper side; they are very unequal-sided at the base, narrower anteriorly, and running a long way down the stem in the shape of a gradually narrowing wing, but posteriorly much dilated and semicordate, then suddenly contracted into a decurrent base, which is scarcely more than a ridge or slight rim on the stem. In the perfect form (e.g., in Dr. Stirton's specimens from Ben Lawers) there are mostly present about midway of the rounded postical margin a few ciliiform teeth; while the very much smaller leaves towards the base of the stem and branches are always deeply cut, as above described. The cell-walls are decidedly thickened, and have large trigones at the corners; endochrome sparing; oil-corpuscules none. In most of these particulars, and in others indicated in the detailed description, there is a close and unmistakable approach to *J. colorata* and *J. grandiflora*. But in *Nardia compressa* the leaves project almost equally in front and at back; they are cordate-reniform, quite entire, almost symmetrical at the base, and not decurrent. The cells are much larger, very slightly thickened at the angles, and they contain, besides the endochrome, a few oil-corpuscules, like those of *N. scalaris*, but less numerous.

The branches do not spring from the very middle of the underside of the stem, but are so far axillary as to be always veiled at the base by the postical angle of the adjacent leaf: i.e., they are *postico-lateral*. They have the same origin in *J. colorata* and *J. grandiflora*.

Carrington found the folioles subulate, entire, and so they probably are, occasionally, as in the allied *J. colorata*. All that I have seen were more or less bifid; the most perfect were composed in the lower half of small quadrate cells, 6 in the length, and 3 (or 4) in the breadth; the laciniæ 2 cells wide at the base, at the apex only 1, and 3 or 4 cells long—these cells being rectangular or oblong.

2. JUNGERMANNIA (JAMESONIELLA) COLORATA, *Lehm.*

Jung. colorata, Lehm. in Linnæa iv., 366; G. L. et N. Syn. Hep, 86 et 673.

Hab. in monte Tunguragua, alt. 2500 metr., ad terram sub Ericearum umbra, foliis fruticulorum decisis marcidis radicata, sterilis. In ins. Falklandicis ab ill. Hooker f. cum perianthiis, lecta est. (Pro distributione vide supra, necnon "Syn. Hep.," l. cit.)

Folia 1·0 × 1·0, 1·2 × 1·4; c. $\frac{1}{35}$; bracteæ 1·05; per. 1·3 × ·8 mm.

Elata speciosa dense late cæspitosa, e fulvo rosea, inferne badia. *Caules* 6-10 cm. longi, vel altiores, a basi decumbente nuda v. denudata parce flagellifera erecti, subflexuosi, apice stricto decurvulove indefinite crescentes, polyphylli, simplices v. pauciramei, ramis fastigiatis axillaribus—e foliorum angulo postico, nec e caule extra foliorum bases, ortis, nudi (haud squamulosi) perraro radicellosi. *Flagella*, ubi rarius adsunt, postico-lateralia (sic uti rami) breviuscula, valida, foliis rudimentariis radicellisque tenuibus albidis sparsa.

Folia dense imbricata, decurvo-secunda, caulis faciem posticam latius quam anticam transeuntia, incurvo-concava, toto margine cum contrariis fere contigua, insertione subtransversa, basi antica sensim, postica abrupte, breviuscule decurrentia, integerrima, substantia crassa, fragilia, punctato-areolata; cellulæ mediocres, valde incrassatæ, trigonis maximis subopacis, facie interna 6-sinuatæ, endochromio parcissimo, cuticula pulchre crebreque verruculosa.

Foliola pauca versus caulis apicem (nec semper) inveniuntur: foliis multoties minora, perangusta, subulata acuminata.

Flores dioici: ♀ terminales, innovatione unilaterali—raro duabus oppositis—suffulti. *Bracteæ* propriæ unijugæ, foliis subæquilongæ, dilatatæ et cum bracteola intermedia 2-4-fida in membranam plurilaciniatam, laciniis subulatis flexuosis sæpe ruptis, alte connatæ, antice tamen liberæ basinque versus ciliis sub 3 deversis armatæ. *Folia subfloralia*, bracteis proxime sequentia, varie sinuato-lobulata, alterna tamen, foliolo subulato trifido uno solo illorum connato.

Perianthia bracteas paulo superantia, oblonga, profunde 6-10-plicata, ore parum constricto brevi-lobulata erosulaque. Cætera haud visa.

Var. *elatior:* tota rosea, 15-20 cm. longa. *Folia* fragilissima, basi utrinque fere æqualiter decurrentia, sicuti potius obovato-orbiculata subspatulata dicenda, minus concava, margine intensius colorato repanda, interdum apice subretusa.

J. colorata, insulis Falklandicis ab Hookero f. lecta, iisdem duabus formis constat. Aliæ formæ ab eodem detectæ sunt: 1. minor fere nigra, ad Cap. Horn; 2. nigrescens, magis flagellifera, foliis valde homomallis.

3. JUNGERMANNIA (JAMESONIELLA) GRANDIFLORA, *Lindenb. et G.* Syn. Hep., 673.

Hab. in montis Tunguragua regione sylvatica, ad terram sub fruticulorum umbra, sæpe *J. colorata* consociata. Eandem speciem legit beat. Jameson in m. Pichincha; antequam in Chili a cl. Gay inventa est.

Folia 1·0 × ·9, 1·3 × 1·1; c. $\frac{1}{35}$; bracteæ 2·0 longæ; brlæ. 1·05 × ·5; per. 3·5 × 1·0 mm.

Laxe cæspitosa, badia, apice leviter rosea. *Caules* 8 cm. longi, a basi (rhizomate) tenui prostrata flexuosa denudata subdivisa flagellifera assurgentes, flexuosi, apice decurvo-circinati, subsimplices, raro ramum unum alterumve proferentes, fere arhizi, *squamulis tamen minutis* subulatis setaceisve *arcte articulatis* sparse densiusve *obsessi*. *Flagella* postico-lateralia, subaphylla, radicellifera, e rhizomate orta; raro e medio caule proveniunt alia stoloniformia microphylla arhiza.

Folia minus arcte imbricata, subpatentia, transversa, decurvo-secunda, oblique obovato-rotunda, apice incurvula, margine antico toto valide incurva, basi longe decurrentia, postico plana, rotundata, basi multo brevius decurrentia, integerrima. *Cellulæ* mediocres, læves v. obscurissime verruculosæ, parum incrassatæ, intus ovali-5-6-gonæ, endochromio parco annulari. *Foliola* nulla vidi.

Flores dioici: ♀ terminales, innovatione brevi (sæpe bifida) suffulti. *Bracteæ* unijugæ, foliis sublongiores, ovato-lanceolatæ, varie laciniatæ; *bracteola* duplo brevior, libera, ovato-lanceolata subacuminata, medio margine utrinque 1-dentata-lobulatave.

Perianthia alte emersa, foliis triplo longiora, ovato-subulata, obtusa, alte 6-plicata, plicis 2 anticis obtusioribus, omnibus obliquis subspiralibus, ore subdenticulata. Cætera desunt.

Andrœcia medio caule posita; *bracteæ* plurijugæ, foliis consecutivæ iisdem vix breviores, antice lobulo angusto tota longitudine cum bractea connato margine incurvo spinis 1-3 armato, auctæ. *Antheridia* non aderant.

J. œnops, L. et G., found by Bertero in Chili, is evidently a close ally of *J. colorata* and *grandiflora;* and so are three species, all from the Sandwich Islands, described by Austin (Proc. Acad. Nat. Sc. Philad., Dec., 1869). Two of these, *J. rigida*, Aust., and *J. coriacea*, Aust., are roseate; the third, *J. robusta*, Aust., is pale, and has eroso-dentate leaves: it should therefore approach *J. Carringtoni*, but I have not seen specimens.

Before dismissing these "nobiles" of the genus *Jungermannia*, I wish to point out that there is a fine group which no one has yet taken up, namely, that of which *J. perfoliata*, Sw., is the type. In the tall stems, beset with large opposite (and often connate) leaves, which are mostly subtriangular in outline, strongly recurved at the antical margin, and either entire at the apex or very unequally bidentate, it approaches *Leioscyphus*, the opposite-leaved *Lophocoleæ*, and some *Plagiochilæ*; but differs from them all—much as *Diplophyllum* from *Scapania*—in the turgid pluriplicate perianth, and from the two former in the absence of folioles (except in the involucre). In the perianth, and in the (usually) 10-cleft frill-like involucre, it approaches *Jamesoniella*, but in all other respects stands widely apart. For this group I claim the rank of a genus, with the following character.

SYZYGIELLA, *Spruce*, nov. gen.

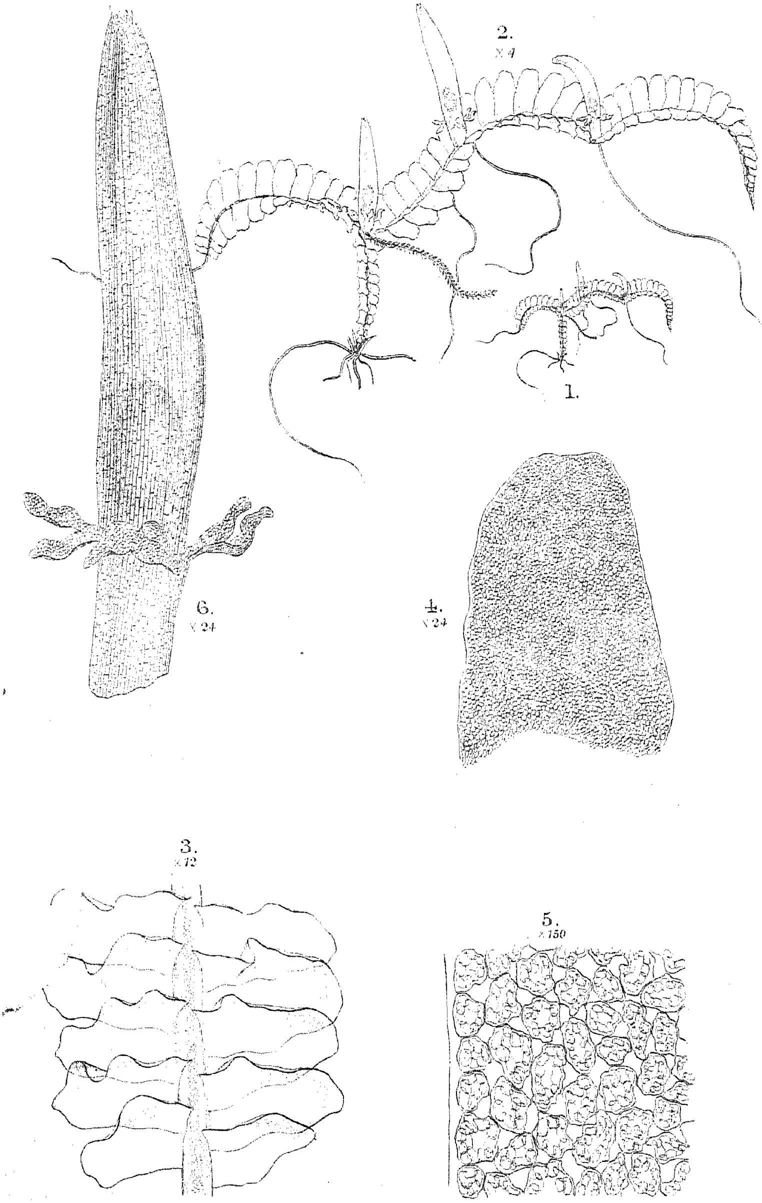
Plantæ elatæ speciosæ cæspitosæ, e flavo-viridi roseæ, rarius purpureo-sanguineæ. *Caules* validi assurgentes parum ramosi, subtus radicelliferi, flagellis nullis. *Folia maxima* 3-4 mm. longa, *opposita*, antice posticeque basi contigua subconnatave, oblique inserta, succuba, sæpius ovato-triangularia raro suborbiculata, *margine antico recurva*, basi postica ampliata, *apice pro more inæqualiter bidentata*, in aliis speciebus tamen integra, vel alia integra, alia oblique unidentata, alia bidentella, in una eademque stirpe. *Cellulæ* mediocres æquilateræ incrassatæ, *trigonis magnis sæpe intensius coloratis*. *Foliola* 0 (nisi ad involucrum). *Flores* dioici: ♀ terminales, fertiles *sine ulla innovatione; bracteæ* foliis sæpe subbreviores, 2-jugæ, mediante bracteola bifida, in involucrum 10- v. pluri- laciniatum, laciniis integerrimis spinulosisve, connatæ. [*Folia subfloralia* 3-4-juga, cæteris caulinis basi latiora, basi antica latiora altiusque connata sinuata v. obsolete lobulata—anne olim antheridiifera?] Pistillidia sub 20. *Perianthia maxima*, ovata, turgida, solum apicem versus 4-5-8- v. 10- plicata. *Calyptra* parvula, *dimidio inferiore subincrassata*, superiore tenuis. *Capsula maxima* 3 mm. longa, oblongo-globosa, ad basin usque 4-valvis; cætera *Eujungermanniæ*. *Andrœcia* medio caule posita; *bracteæ* f. caulinis consecutivæ, subminores, paucijugæ; *antheridia* solitaria (?) imperfecta sola visa.

Habitatio persæpe arborea, raro terrestris. *Distributio*: in montibus excelsis Americæ tropicæ, a Mexico et Antillis ad Chili usque.—Species sunt sequentes:

S. perfoliata, Swartz, Prodr., 143; G. L. et N. Syn. Hep., 85.
S. macrocalyx, Mont. Ann. Sc., 1843; Syn. Hep., 102.
S. plagiochiloides, Spruce, n.sp.
,, var. *subintegra*, Spruce.
S. pectiniformis, Spruce, n.sp.
S. concreta, Gotts. Mex. Leverm., 82.
etc., etc.

Another group of large handsome species, deserving at least the rank of a subgenus, is the "Jungermanniæ Heteromallæ" of "Syn. Hep.," with two or three added on that have not hitherto found their right place. We have one European species, *J. Doniana*, Hook., found in Scotland and the Danubian provinces; the others belong to the tropics and the south temperate zone. This group, which I call *Anastrophyllum*, is remarkable for the way the somewhat rigid, rufous leaves turn upwards; they are usually canaliculato-concave, more or less deeply bifid, with acute and often white hair-like points. Folioles none. Perianths large, rose-purple, with a long pyramidal and more or less canescent point. Capsules large, elongate.—*J. monodon*, Tayl., is an aberrant member of this group, having the canescenti-cuspidate leaves entire at the point, and the capsule nearly globose.—Some of the species, and especially *J. schismoides*, Mont., have a curious habit of turning face downwards when dry, so that the leaves seem incubous, and simulate those of *Isotachis*. I gathered fertile specimens of *J. piligera*, Nees, in the Peruvian Andes, quite

Tab. 178.

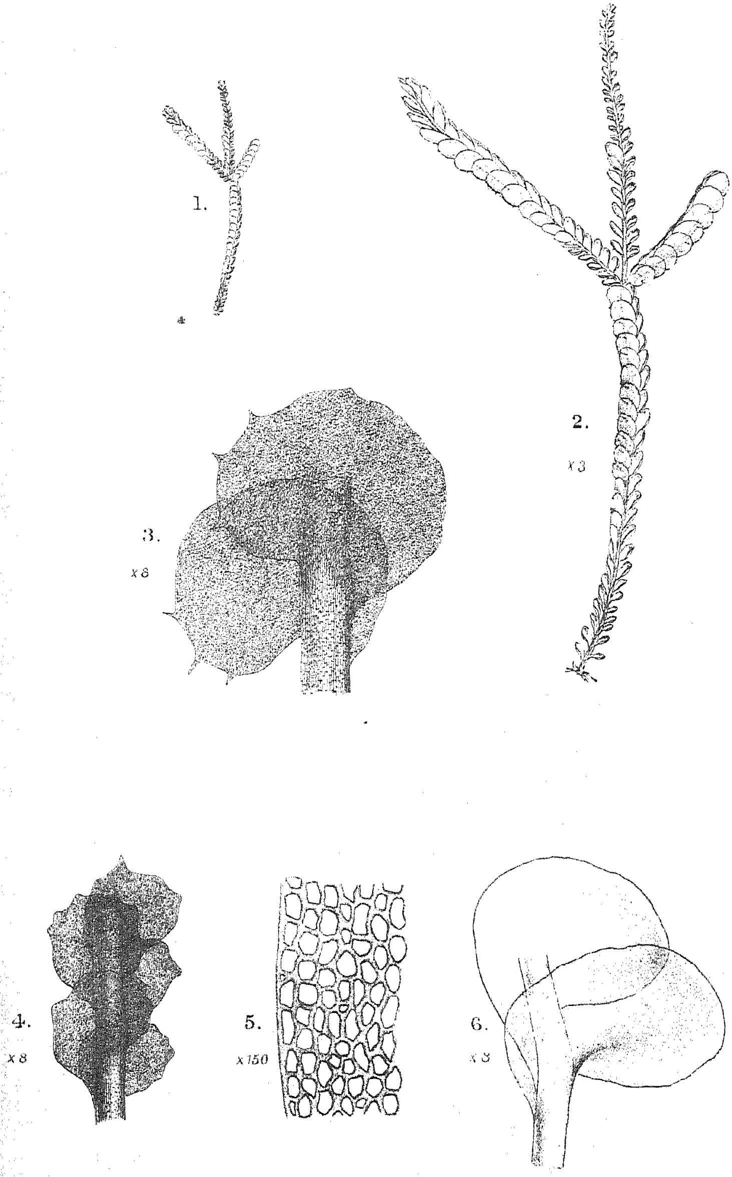


D Blair F.L.S. del. et. lith.

Mintern Bros. imp.

Anomoclada mucosa, *Spruce.*

Tab. 179.



D. Blair F.L.S. del et lith.

Mintern Bros. imp.

Jungermannia Carringtoni, *Balf.*

agreeing with the Javan plant. The following is the character I assign to the entire group.

Anastrophyllum, Spruce (*Jungermanniæ* subgenus).

Plantæ cæspitosæ elatiusculæ *rufescentes*, raro purpurascentes, erectæ vel a basi prostrata assurgentes, parum ramosæ, ramis postico-lateralibus, subradicelliferæ raro flagelliferæ. *Folia* magna, aliquando 2 mm. excedentia, oblique inserta, succuba, *assurgenti-subsecunda*, ovata *concava*, apice bidentata bifidave (in unica specie integra), *lobis inæqualibus*, antico sat minore, sæpe *canaliculatus*, pro more acutis *incano-cuspidatisque*, integerrimis v. denticulatis, basi antica lacinula aucta v. nuda. *Cellulæ* parvæ ($\frac{1}{60}$-$\frac{1}{40}$ mm.) æquilateræ v. subelongatæ, omnes fere conformes guttulatæ, *incrassatæ*, *intus insigniter* 6-*sinuatæ*, extus scaberulæ. *Foliola* nulla. *Flores* dioici: ♀ terminales, *innovatione* (raro prolifera) *suffulti*. *Bracteæ* foliis submajores, magis profunde bifidæ (raro 3-4 fidæ) denticulatæque, subinde basi utrinque laciniis paucis armatæ; *bracteola* nulla, vel (quando raro adsit) 2-3 fida cum bracteis connata. *Perianthia maxima*, *pulchre roseo-purpurea apice canescentia*, tenuia, plus minus fusiformia, *sæpe* 4-*plo longiora quam lata* (juniora sæpissime subulata), fere a basi *alte* 3-, 5-, *vel* 8- *plicata*, ore constricto fimbriata. *Capsula* sæpe maxima, oblongo-cylindrica, raro subglobosa, ad basin usque 4-valvis. *Amenta* ♂ terminalia; *bracteæ* turgidæ, in *A. Doniano* tetrandræ, in *A. leucocephalo* diandræ.

Habitatio fere semper rupestris, raro terrestris arboreave. *Distributio :* per montes tropicos necnon in tota hemisphæra australi; unica species (*A. Donianum*) europæa. In Andibus nusquam supra zonam sylvaticam ascendunt.—Species sunt: *Anastrophyllum Donianum*, Hook.; *piligerum*, Nees.; *leucocephalum*, Tayl.; *calocystum*, Spruce; *schismoides*, Mont.; *puniceum*, Nees; *monodon*, Tayl.; &c., &c.

[I add corrections of a few errata in the foregoing paper.
P. 167, last line of text, for "decus" read "secus."
P. 167, first line of note, for "impressis" read "impressi."
P. 169, line 25 from bottom, for "planitie" read "planities."
P. 169, „ 22 „ „ „ "*rangeferiana*" read "*rangiferina*."
P. 126, „ 3 „ „ „ "dimitibus" read "limitibus."

P. 198, to foot-note add: The name *Lejeunea diversifolia*, Gottsch., Mex. Leverm. (1863), cannot stand, there being a previous *L. diversifolia*, Mitt., Hep. Ind. in. Journ. of Linn. Soc., 1860, gathered in Sikkim by Dr. Hooker. I propose therefore to substitute the name *L. diversiloba*, which expresses the fact that the lobule is sometimes half as large as the leaf, but very often almost obsolete.]

DESCRIPTION OF TABS. 178, 179.

Tab. 178. *Anomoclada mucosa*, Spruce. From specimens collected in the Forest of Javita, at the head of the Atabapo. Fig. 1. ♀ plant, nat. size. 2. Ditto, magnified. 3. Underside of portion of stem with leaves (residua of folioles omitted). 4. Leaf, flattened. 5. Leaf-cells. 6. Perianth.

Tab. 179. *Jungermannia* (*Jamesoniella*) *Carringtoni*, Spruce. From specimens collected on Ben Lawers by Dr. Stirton. Fig. 1. Plant, nat. size. 2. Ditto, magnified (hooked points of branches not shown). 3. Stem leaves flattened. 4. Leaves at base of a slender branch. 5. Leaf-cells. 6. Entire (edentate) leaves rom the same plant. (All figures, except No. 1 in each plate, magnified.)

NEW SPECIES OF IXIEÆ.

By J. G. Baker, F.L.S.

Of the following eighteen undescribed species of *Ixieæ* there are specimens in the herbaria either of Kew or the British Museum, with the exception of three of the *Romuleæ*, of which there are drawings with notes by Dean Herbert in the Lindley Library at South Kensington.

Romulea cameroomiana, *Baker*.—Bulbus globosus, 4 lin. crassus, tunicis brunneis, exterioribus membranaceis. Folia producta circiter 4, semipedalia vel pedalia, dura, nitida, glabra, angustissime linearia, ⅓ lin. lata. Scapi ad bulbum 1-2, stricti, gracillimi, simplices, erecti, uniflori, demum 6-10-pollicares. Spathæ valvæ lanceolatæ, subæquales, 5-6 lin. longæ. Perianthium lilacinum, spatha subæquilongum, tubo brevissimo, segmentis oblongis acutis. Pistillum antheris æquilongum. Capsula oblonga, 4 lin longa, seminibus globosis ¾ lin. crassis, testa nitida castanea. *Montes Cameroon*, alt. 7000-9000 pedes; G. Mann, 2135! Near *R. Columnæ*, S. & M.

R. cuprea, *Baker*.—Bulbum non vidi. Folia 3, setacea, suberecta, 3-4 poll. longa, ½ lin. crassa, 4-angulata, costa prominente. Scapus brevis, furcatus, folio reducto unico ad furcam bracteatus. Pedicelli floriferi ascendentes, 12-15 lin. longi. Spathæ valvæ lanceolatæ, exterior 6 lin. longa, interior minor. Perianthium 12-14 lin. longum, extus viridulo-ochroleucum, intus dimidio superiori cupreo-fulvo, dimidio inferiori luteo, striis purpureis. Stamina perianthio duplo breviora, antheris filamentis puberulis æquilongis. Pistillum antheris æquilongum, ramis stigmatosis brevibus patulis. *C. B. Spei*. Described from an unpublished coloured sketch by Dean Herbert in his collection in the Lindley Library, under the name of "*Trichonema cupreum*, mihi; new." Closely allied to *R. rosea* (Bot. Mag., t, 1225).

R. Macowani, *Baker*.—Bulbus globosus, 5-6 lin. crassus, tunicis firmis brunneis apice cuspidatis. Folia 4-5, erecta vel patula, dura, persistentia, glabra, subteretia, 6-8 poll. longa, ¾ lin. crassa, 4-angulata. Flores ad bulbum 1-4, pedunculis supra terram simplicibus 1-2 poll. longis. Spathæ valvæ lanceolatæ, acutæ, subæquales, 12-15 lin. longæ. Perianthii tubus 9-12 lin. longus, dimidio inferiori gracillimo, apice conico dilatato, limbus infundibularis, 15 lin. longus, dimidio inferiori splendide aurantiaco, superne pallidiori lilacino tincto. Stamina limbo duplo breviora, antheris angustis luteis 5-6 lin. longis. Pistillum antheras superans, ramis 6 subulatis falcatis. *C. B. Spei in ditione Somerset;* Mrs. Barber! McOwan, 1547! Perhaps the fine of all the known species of the genus. Well marked from *bulb codiodes* and *sublutea* by its comparatively long tube, filiform in the lower half.

R. barbata, *Baker*.—Bulbum non vidi. Folia 3, subulato-quadrangulata, erecta, semi-pedalia, 1 lin. crassa. Pedunculi uniflori, 1½ poll. longi. Spathæ valvæ exterior viridis, firma lanceolata, 6-9 lin. longa; interior minor membranacea. Perianthium 15-16 lin. longum, tubo brevissimo, limbo fauce crocco, sursum lilacino, segmentis oblongis acutis, medio 3-4 lin. latis. Stamina limbo duplo breviora, filamentis puberulis. Pistillum antheras superans, ramis stigmatosis falcatis profundo emarginatis. *C. B. Spei.* Described from a drawing of Dean Herbert's, called "*Trichonema barbatum.*"

R. LATIFOLIA, *Baker.*—Folia radicalia 4, anguste linearia, 4-5 poll. longa, 1½-2 lin. lata rigida, glabra, subfalcata. Scapi 1-3-flori, pedicellis 12-15 lin. longis. Spathæ valva exterior lanceolata, viridis, 8-9 lin. longa; interior multo minor, deltoidea, membranacea. Perianthium album, 15 lin. longum, tubo brevi late infundibulari, segmentis oblongis acutis dimidio inferiori citrino tinctis. Stamina limbo duplo breviora, filamentis pilosis. Pistillum antheras superans, stigmatibus brevibus falcatis emarginatis. *C. B. Spei.* From a drawing of Dean Herbert's, marked "*Trichonema latifolium.*"

IXIA MICRANDRA, *Baker.*—Bulbus globosus, 5-6 lin. crassus, tunicis exterioribus subtiliter fibrosis. Folium basale unicum parvum, lineare; suprabasalia 1-2, teretia vel angustissime linearia. Caulis simplex, filiformis, strictus, 1-1½-pedalis. Spica dense 2-6-flora, rachi flexuosa. Spathæ valvæ 2-3 lin. longæ, brunneolæ vel pallidæ, exterior breviter tricuspidata, interior profundior bicuspidata. Tubus filiformis, spatha æquilongus; limbus 5-7 lin. longus, albus, fundo immaculatus, segmentis oblongis. Antheræ oblongæ, ¾-1 lin. longæ, luteæ, ad faucem tubi sessiles vel subsessiles. Stylus ex tubo haud protrusus. *C. B. Spei.* Drege, 8372! Zeyher, 4009!, 4010!, 4011! Dr. Stanger! Dr. Thom, 457! Near *I. polystachya*, but the leaves reduced to about three very narrow and distantly superposed, and differing also by its dense short capitate spikes and very small anthers.

MORPHIXIA TRICHORHIZA, *Baker.*—Bulbus globosus, 3-4 lin. crassus, tunicis permultis subtiliter fibroso-reticulatis, secus collum in setas duras persistentes longe productis. Caulis strictus, filiformis, 3-5-pollicaris, foliis circiter 3, parvis, linearibus, glabris, firmis, superpositis, præditus. Spica simplex, erecta, biflora. Spathæ valvæ latæ, teneræ, membranaceæ, brunneæ, 3 lin. longæ, apice irregulariter dentatæ. Perianthii tubus 2 lin. longus, pallidus, e basi ad apicem sensim ampliatus; limbus 6-7 lin. longus, saturate violaceus, segmentis ascendentibus anguste oblongis. Stamina limbo duplo breviora, antheris ligulatis 2 lin. longis. Stylus ex tubo protrusus, ramis stigmatosis tribus, falcatis, 1 lin. longis. *Natal;* Dr. Sutherland! A very distinct and pretty little plant, differing from all the other Morphixias by its brown tender spathes and finely reticulated bulb-coats produced into a dense cluster of long persistent bristles at the neck.

M. COOPERI, *Baker.*—Bulbum non vidi. Folia basalia pedalia et ultra, supra basin subulata, gracillima, ⅓ lin. crassa. Scapus simplex, teres, 8-12-pollicaris, foliis 2-3 similibus valde reductis superpositis præditus. Spica secunda, subdense 7-8 flora. Spathæ valvæ oblongæ, cartilagineæ, subæquales, 2 lin. longæ, apice truncatæ castaneæ. Perianthii tubus cylindricus 2-pollicaris; limbi albidi segmenta patula, albida, oblanceolata, obtusa, 5-6 lin. longa. Stylus ex tubo distincte protrusus. *C. B. Spei in ditione Worcester;* Cooper, 1628! 1683! Allied to *M. paniculata*, Baker (*Ixia longiflora*, Bot. Mag., t. 256).

M. NERVOSA, *Baker.*—Bulbum non vidi. Folia radicalia producta circiter 5, flabellata, linearia, sesquipedalia, medio 4-5 lin. lata, crassa, rigidula, profunde 5-nervata. Caulis simplex, teres, strictus, 2-3-pedalis, supra basin folio unico parvo præditus. Spica æquilateralis, simplex, semipedalis, superne densus. Spathæ valvæ ligulatæ, brunneæ, integræ, rigidæ, subæquales, 3 4 lin. longæ. Perianthii tubus 1-1½-pollicaris, basi ½ lin., apice 1 lin. crassus; limbus ochroleucus, segmentis patulis oblanceolatis obtusis 3-4 lin. longis. Genitalia ex tubo protrusa. Antheræ ligulatæ, 1½ lin. longæ. *C. B. Spei*; Zeyher, 1632! Allied to *M. paniculata*.

M. JUNCIFOLIA, *Baker*.—Bulbus globosus, 5-6 lin. crassus, tunicis subtiliter fibrosis. Folia radicalia pedalia et ultra, subulata, dura, ½ lin. crassa. Caulis gracilis, strictus, teres, pedalis et ultra, foliis 1-2 reductis præditus. Spica laxa, æquilateralis, 2-5-pollicaris. Valvæ spathæ oblongæ, subæquales, integræ, cartilagineæ, viridulæ, 1½-2 lin. longæ. Perianthii saturate violacei tubus cylindricus, 6-9 lin. longus; limbi segmenta oblonga, 3-4 lin. longa. Genitalia ex tubo distincte protrusa. Antheræ ligulatæ. 1½ lin. longæ. *C. B. Spei*; Zeyher, 1619! Group of *M. paniculata* with small violet flowers.

GEISSORHIZA PURPUREO-LUTEA, *Baker*.—Bulbus oblongus, 3 lin. crassus, tunicis brunneis cartilagineis in segmentas lineares multiserialiter imbricatas sectis. Folia 3, linearia, glabra, graminoidea, 1-1½ poll. longa, 1-2 lin. lata, profunde multistriata, supremum maximum caulem vaginans. Scapus filiformis, 1½-4 pollicaris, uniflorus. Spathæ valvæ oblongæ integræ, virides, exterior 3 lin. longa. Perianthium 6 lin. longum, tubo brevi infundibulari saturate purpureo, segmentis oblongis diu imbricatis sulphureo-luteis. Stamina limbo ⅓ breviora, antheris sagittatis, filamentis subulatis basi purpureis, apice luteis. Stylus ex tubo longe protrusus. *C. B. Spei*; Drege, 8476! Near *G. humilis*, Ker. (Bot. Mag , t. 1255).

G. ERECTA, *Baker*.—Bulbus globosus, 3 lin. crassus, tunicis brunneis duris haud imbricatis. Caulis vix pedalis, simplex vel profunde ramosus. Folia tria, superposita, linearia, glabra, graminoidea, 3-4 poll. longa, 1-1½ lin. lata. Spica 5-6-flora, erecta, rachi insigniter flexuosa, floribus erecto-patentibus. Spathæ valvæ oblongo-ligulatæ, 4 lin. longæ, subæquales, tubum arcte involventes. Perianthii tubus cylindricus, 3 lin. longus; limbus 5 lin. longus, pallide ruber, segmentis oblongis, imbricatis, diu ascendentibus. Stamina limbo paullo breviora, antheris 3 lin. longis. Stylis ex tubo longe protrusus. *C. B. Spei*; Drege, 8468! Near *G. secunda*, Ker. (Bot. Mag., t. 597), but very different in its close, equilateral spike and very zigzag rachis.

G. FILIFOLIA, *Baker*.—Bulbus magnitudine pisi. Caulis semipedalis, strictus, filiformis. Folia 3, distantia, superposita, erecta, filiformia, infimum 6-7 pollicare, spicam superans, supermum ad medium caulis impositum. Spica laxa triflora. Spathæ valvæ 3 lin. longæ virides lanceolatæ. Perianthii tubus spatha brevior; limbus 4 lin. longus, albidus, fauce purpureo, segmentis oblongis. Genitalia limbo ⅓ breviora. *C. B. Spei*; Dr. Alexander Prior in Herb. Mus. Brit.! Near *G. secunda*.

G. WRIGHTII, *Baker*.—Bulbus globosus, 4 lin. crassus, tunicis cartilagineis brunneis nullo modo sectis. Folia 3-4, linearia, graminoidea, glabra, 6-9 poll. longa, profunde multi-striata, supremum maximum, basi 3-4 lin. latum, 10-12-nervatum. Caulis pedalis, simplex vel profunde furcatus. Spica laxa, secunda, 3-4 pollicaris, 6-8-flora. Spathæ valvæ oblongæ, virides, 3-4 lin. longæ. Perianthium 6-8 lin. longum, rubrum, tubo spatha breviori, segmentis oblongis imbricatis, interioribus albidis. Stamina limbo ⅓ breviora, antheris 2 lin. longis. *C. B. Spei ad Simon's Bay ;* C. Wright, 243 ! Near *G. ciliaris*, Salisb , but glabrous, with smaller flowers and leaves, with numerous close, very distinct ribs.

G. MINIMA, *Baker*.—Bulbum non vidi. Folia 2-4, subulata, falcata, glabra, firma, 1-1½ poll. longa, ¼ lin. crassa. Scapus filiformis, erectus, 1-1½-pollicaris, apice 1-2-florus. Spathæ valvæ oblongo-lanceolatæ, 2 lin. longæ, integræ, virides, rubro tinctæ. Perianthii tubus filiformis, ex spatha distincte exsertus, 2½-3 lin. longus; limbus infundibularis, 2 lin. longus, segmentis oblongis albis exterioribus dorso rubris. *C. B. Spei;* Drege, 2623 ! A very distinct little plant, with the exserted tube of *G. excisa* (Bot. Mag., t. 584), but totally different in other respects.

G. BOJERI, *Baker*.—Bulbus parvus, globosus, tunicis subtiliter fibroso-reticulatis. Caulis gracilis, flexuosus, glaber, 9-15-pollicaris. Folia 4, superposita, anguste linearia, firma, erecta, glabra, inferiora semipedalia, ½-1 lin. lata, distincte costata, superiora basi haud dilatata. Spica 1-3 flora. Valvæ spathæ oblongæ, integræ, virides, 4½-5 lin. longæ. Perianthii tubus spatha brevior ; limbus infundibularis, roseus, 4½ lin. longus, segmentis oblongis subacutis. Stamina limbo duplo breviora. *Madagascaria in montibus Antoungoan prov. Emirni ;* Hilsenberg et Bojer ! (Hb. Kew et Mus. Brit.). Very near *G alpina*, Hook. fil., in Journ. Linn. Soc. vii., 228, from the Cameroons.

HESPERANTHA HUMILIS, *Baker*.—Bulbus globoso-conicus 9-10 lin. crassus, tunicis brunneis cartilagineis, e basi in segmentas lineares sectis. Caulis supra terram nullus. Folia 3-4, ligulata, falcata, firma, glabra, obtusa, 1½-2 poll. longa, 3-4 lin. lata, e medio ad basin angustata. Flores 5-6, e medio rosulæ foliorum corymbosi. Spathæ valva exterior late oblonga navicularis, viridis, 8-9 lin. longa ; interior lanceolata. Perianthii tubus cylindricus, 6-7 lin. longus ; limbus rubescens, late infundibularis, 7-8 lin. longus, segmentis obovato-cuneatis. Stylus ex tubo haud protrusus, stigmatibus subulatis 2½-3 lin. longis. *C. B. Spei ad Roggeveld*, Burchell, 1320 ! Distinct from all the other species by its acaulescent habit.

H. RUBELLA, *Baker*.—Bulbum non vidi. Folia basalia producta. linearia, rigida, crassa, glabra, semipedalia vel pedalia, plana, 2-2½ in. lata, distincte nervata, costa et marginibus incrassatis ; caulinum unicum, simile, reductum. Spica simplex vel profunde furcata, 3-4 poll. longa, 6-15-flora, æquilateralis, rachi flexuosa. Valvæ spathæ oblongæ, integræ, 6-7 lin. longæ, viridulæ vel rubro tinctæ, margine membranaceæ. Perianthii tubus cylindricus 3-4 lin. longus ; limbus infundibularis, rubellus, 6-7 lin. longus, segmentis oblongis. Antheræ luteæ, 3 lin. longæ. *C. B. Spei in ditione Transvaal ;* Cooper, 1027 ! Nearest *H. Baurii*, Baker, but the flowers much smaller, and tube and spathe shorter.

COROLLA PIERREANA;

SIVE STIRPIUM CAMBODIANARUM A. CL. L. PIERRE, HORTI BOT; SAIGONENSIS PRÆPOSITO, LECTARUM ECLOGÆ;

AUCTORE H. F. HANCE, PH.D.

PUGILLUS PRIMUS, DECADES QUINQUE COMPLECTENS.

Centrolepidem novam in hocce diario nuper proponens, jam de laudabilibus clar. *Ludovici Pierre*, horti Saigonensis indefessi directoris, laboribus, in pervestiganda montium intactarumque Cambodiæ silvarum ditissima Chloride, breviter disservi. Quæ sequuntur stirpium nonnullarum ab ipso benevole concessarum diagnoses amico docto, gravi, nimium fere verecundo, in gratissimi animi tesseram omni qua par est observantia lætus dico. Hodie, negotiis molestiisque variis implicitus atque impeditus, prolixiorem enumerationem describere non potui: sin autem a SUMMO NUMINE valetudo ac otium modo concedantur, plantarum plurium eximiæ hujus collectionis adhuc ut credo ineditarum characteres propediem edere mihi est in mente.

Scribebam Whampoæ Sinarum,
exeunte Februario, 1876.

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1. ILLICIUM CAMBODIANUM, *sp. nov.*—Ramis junioribus angulatis cinereo-griseis, foliis elliptico-lanceolatis acuminatis basi in petiolum 3-6 lin. longum angustatis 3-5½ poll. longis glaberrimis utrinque opacis subtus subochraceis, gemmis perulis pallidis involutis, floribus plerumque fasciculatis pedunculis semipollicaribus crassiuscule filiformibus suffultis, sepalis 3 ovatis ciliatis 1 lin. longis petalis 13 triseriatis 3 externis rotundatis 1½ lin. longis 5 mediis rotundato-ovatis 2 lin. longis 5 intimis oblongis 2 lin. longis omnibus ciliatis, staminibus circ. 12 filamentis antheris æque longis ac latis, pedunculo fructifero crasso angulato pollicari, carpellis 12 (nondum maturis 5 lin. longis) lignosis valde compressis dorso convexis superne in rostrum subulatum varie curvatum attenuatis, semine basi angulo interno adfixo.

In monte Kam chai, h.e. mons elephantum. Exiguitate florum *I. parvifloro*, Mx., numero partium floralium *I. majori*, Hook f. et Th. (nimis breviter descripto), carpellis rostratis *I. Griffithii*, Hook. f. et Th., accedit. Carpella in *I. religioso*, S. et Z., etiam sæpe rostrata.

2. *Barclaya longifolia*, Wall.

3. *Garcinia* (*Discostigma*) *merguensis*, Wt.—Mire cum tabula Wightiana (Ic. pl. Ind. or. 116) congruens, et venis, etsi tenuibus, non *Calophyllorum* ritu striiformibus, a *G. rostrata* dignoscenda.

4. *Ochrocarpus siamensis*, T. And.—Arbor 6-12 metr. alta, in montibus Pra, prov. Sam rong tong, alt. 300 metr., Martio, 1870. Cum descriptione Miqueliana bene congruit.

5. ADINANDRA PHLEBOPHYLLA, *sp. nov.*—Foliis lanceolato-oblongis obtuse acuminatis 2½-3 poll. longis 10-14 lin. latis supra medium anguste serratis basi cuneatis apice breviter obtuse acuminatis supra glaberrimis venisque elevato-reticulatis subtus sparsim strigosis

novellis sericeo-lanatis petiolo brevissimo una cum costa pilosulo, floribus solitariis cernuis 4 lin. longis, pedunculo 9-12 lin. longo cum bracteolis lanceolato-oblongis calyci approximatis sepalisque late ovatis dense pubescentibus, petalis præter marginem glaberrimum extus dense albido-sericeo-hirsutis.

In montibus Kuang Repen, prov. Tpong, Cambodiarum, alt. 1500 metr., Maio, 1870. A plerisque speciebus petalis hirsutis diversa. *A. Sarosantheræ*, Miq., et *A. lasiopetalæ*, Benth.! præcipue affinis videtur, floribus minoribus aliisque discedens notis.

6. *Schima Noronhæ*, Reinw.—Cum speciminibus Hongkongensibus plane convenit.

7. *Archytæa* (*Ploiarium*) *Vahlii*, Choisy.—Ab hac *A. sessilis*, Scheff.! ex insula Pulo Gebeh, Archipelagi indici, differt foliis angustioribus obtusissimis, floribus sessilibus, pluribusque aliis notis.

8. Dipterocarpus (*Alati*) insularis, *sp. nov.*—Ramulis gemmis pedunculis petiolisque tomento dense stellato immixtis pilis nonnullis simplicibus flavo-fulventi vestitis, foliis ovato-ellipticis obtusiuscule acuminatis basi obtusis v. subcordatis margine repandulo ciliatis 4-5 poll. longis $1\frac{3}{4}$-$2\frac{3}{4}$ poll. latis petiolo pollicari supra nitidiusculis pilis stellatis satis longis notatis subtus in nervis stellis minutis obsessis atque inter eos minute glandulosis nervis primariis utrinque 11-13 satis validis una cum costa nervulisque transversis subtus prominulis, racemis 2-3 floris, floribus subsessilibus, calyce dense stellato-velutino 9 lin. longo fructiferi tubo e basi angustato subobovoideo-sphærico sparsim stellato 6 lin. longo costulis semilineam latis fere ad basin perductis lobis minoribus rotundatis majoribus membranaceis oblongis obtusis basi 3-nerviis minute stellato-pilosis $1\frac{1}{2}$-2 poll. longis 3-5 lin. latis. In ins. Phu kok, sinus siamici, m. Feb. 1874. Maxime affinis *D. glanduloso*, Thw.! cui folia simillima; certe autem specifice differt tomento pallidiore, et præsertim calycis fructiferi multo minoris stellato-pilosuli lobisque 2-3-plo brevioribus membranaceis nec rigide coriaceis elevato-venosissimis.

9. *Dipterocarpus intricatus*, Dyer.—Arbor 15-20 metralis, in planitiebus prov. Pen Louier, Martio 1870 visa. Anamice *Diao mit*; Cambod. *Doin tsai*. *D. Hasseltii*, Bl.! a cl. Dyer cum *D. trinervi*, Bl.! incaute compactus, floribus duplo minoribus, tubo calycino glaberrimo angustiore, non dense tomentoso, fructiferoque dimidio minore apice quasi in collum breve subangustato, tute distinguendus.

10. Vatica (*Euvatica*) astrotricha, *sp. nov.*—Ramulis petiolis inflorescentia calcycis tubo fructuque pilis fasciculatis fulvis dense vestitis, foliis petiolo 5-8 lineari coriaceis 3·4 poll. longis $1\frac{1}{4}$-2 poll. latis oblongis utrinque obtusis glaberrimis costulis utrinque 10-12 arcuatis venulis crebre elevato-reticulatis, paniculis folio circ. duplo brevioribus, stylo apice capitato-trilobo, calycis fructiferi tubo brevi dense piloso lobis 2 majoribus glanduloso-fasciculato-pilosulis obovato-oblongis 5-6 nerviis obtusis 11-14 lin. longis 3-4 lin. latis minoribus 3-4 linealibus omnibus basi angustatis.

In montibus Aval, prov. Sam rong tong, Apr. 1870. Ex descriptionibus videtur valde affinis *V. grandifloræ*, Dyer, a cl. Kurz ad genus *Anisopteram* relatæ, sed calycis fructiferi alis brevioribus glanduloso-pilosulis obtusis, fructuque glabro diversa. *Vaticæ* potius quam *Anisopteræ* adscribenda, sed hæc genera vix distincta credo.

11. SHOREA HYPOCHRA, *sp. nov.*—Ramulis compressis dense et minute stellato-hispidulis, foliis rigide coriaceis oblongis basi late rotundatis apice obtusis 2½-4 poll. longis 1½-2½ poll. latis supra glaberrimis lucidulis subtus minutissime ochraceo-cinereo-lepidotis costa supra impressa subtus conspicue prominula costulis utrinque circ. 18 tenuibus subtus prominulis petiolo 1-1½ poll. longo cinereo-stellato-lepidoto longitudinaliter rimuloso, paniculæ 4-5 pollicaris ramis delapsis sed a cicatricibus superstitibus circ. 7-8, floribus . . . ? nuce brevissime pedicellata ovoidea pollicari sparsim stellato-lepidota, calycis fructiferi basibus accretis ovalibus glaberrimis hispido-ciliatis lobis 2 majoribus 4-4½ poll. longis 10 lin. latis minoribus 2-2½ poll. longis 2-3 lin. latis omnibus oblongo-linearibus obtusis 9-11 nervibus chartaceo-subcoriaceis rubentibus parce breviter glanduloso-pilosulis.

In monte Kam chai, Cambodiæ, et insula Phu kok, sinus siamici. Ex descriptione, apprime videtur affinis *S. leprosulæ*, Miq., cui vero petioli duplo breviores, folia breviter acuminata subtus aliter vestita, calycis fructiferi alæ minores nanæ, tribuuntur, nec harumce mensuræ datæ sunt. Vicina etiam *S. stipulari*, Thw.! cui foliorum forma et constantia simillima.*

12. *Hopea odorata*, Roxb.—In planitie montosisque crescit, *H. fagifolia*, Miq., ob fructum descriptori ignotum imperfecte descripta, ideoque a recentioribus scriptioribus inter dubias species relegata, fide speciminum fructiferorum a cl. Dre. Scheffer donatorum, specie non differt.

13. *Hopea micrantha*, Hook fil.?—En diagnosis.—Ramulis purpureis novellis cum petiolis tomentosis, foliis coriaceis ovatis vel ovato-lanceolatis longe et obtuse cuspidato-acuminatis basi acutiusculis 2¼ poll. longis 1 poll. latis petiolo 2-3 lineali opacis costa supra

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* Liceat hic diagnosin ampliorem speciei classicæ moluccanæ, adhuc imperfecte descriptæ, ex optimis speciminibus ab amico Dre. Scheffer benevole missis compositam, profiteri.

Shorea selanica, Bl.—Ramulis compressis stellato-tomentosis simulque hirtis, foliis chartaceis oblongis basi obtusis apice breviter acuminatis supra præter costam tomentosam levibus lucidulis subtus fulvo-stellato-tomentosis costulis utrinque 19-20 tenuibus angulo 55-60° egressis in ipsum marginem excurrentibus venulis transversis tenuibus connexis omnibus cum costa valida subtus conspicue elevatis 6-7 poll. longis 2¼-2½ poll. latis petiolo 4-5 lin., paniculis axillaribus et terminalibus folia superantibus ad 10 pollicis usque nunc longis ramulis 1-3 poll. longis dense cano-sericeis, floribus more generis secundis breve pedicellatis, calycis extus cano-tomentosi lobis ovatis obtusiusculis intus dimidio inferiore glaberrimis lucidis superiore canis, petalis lanceolato-oblongis nervosis extus hirsutis intus glaberrimis, staminum circ. 15 filamentis complanatis antheris obtusis connectivo in setam iis triplo longiorem producto, nuce ovoidea acuminata dense cinereo-tomentosa, loborum calycinorum fructiferorum e basi lata a medio ad apicem nucis usque angustatorum papyraceorum pilis minutis glandulosis stellatis consitorum tribus majoribus lineari-oblongis obtusissimis 10-nerviis 3 pollicaribus 5-6 lin. latis 2 minoribus 1¼-1½ poll. longis 2-2½ lin. latis acutis 5-nerviis.

Species *S. oblongifoliæ*, Thw.! foliorum forma et magnitudine, calycisque fructiferi constantia et longitudine, proxime accedens, etsi pluribus notis distincta. Perpenso etiam modulo tabulæ minore, icon Rumphiana (Herb. amboin. ii., t. 56) certe haud commendanda.

impressa subtus prominula nervis creberrimis striiformibus inconspicuis, racemis axillaribus petiolo 2-3-plo longioribus tomentellis paucifloris, floribus breviter pedicellatis, nuce ovoidea resina lutea effusa sæpius inquinata, calycis fructiferi lobis majoribus glaberrimis vernicosis spathulato-oblongis obtusis tenuiter membranaceis 7-nerviis 9-12 lin. longis 3 lin. latis basi nucem amplectante tumidis.

A charactere nuper a cl. Dyer dato petiolo breviore, costa supra impressa, calycisque fructiferi lobis auctis brevioribus 7-nerviis discrepat, sed eam vix specie distinctam puto.

14. STERCULIA (*Scaphium*) LYCHNOPHORA, *sp. nov.*—Foliis e basi lata truncata circumscriptione ovatis ad duas tertias longitudinis usque trilobis basi trinerviis lobis lanceolatis acuminatis medio lateralibus paulo divergentibus longiore sinubus obtusis glaberrimis utrinque nitidis reticulato-venosis costulis subtus rete utrinque sed subtus magis prominulis 9-11 poll. longis 5½-7 poll. latis petiolis 4-7 poll. longis teretibus sulcato-striatis apice parum incrassatis et discoloribus, folliculis cito dehiscentibus membranaceis pulchre reticulato-venosis subtilissime glanduloso-punctatis punctulis purpureo-brunneis sub lente minute elevatis extus dilute brunneis intus pallidis navicularibus obtusis dimidio inferiore duplo latioribus dorso rotundatis marginibus interioribus planiusculis 6 poll. longis infra medium 1¼ poll. latis, semine basin folliculi occupante ovoideo 10 lin. longo testa crustacea tenuissime puberula badia lucidula rugosula.

In monte Kam chai, prov. Kampot, Apr. 1874. Cambodiane *Smerang*, Anamice ; *Loe hoi* audit. Teste cl. Pierre, semina spongiosa aqua macerata tumida et gelatinosa fiunt. Flores non vidi; præsto sunt tantum folliculi disjuncti et ramuli apex folia quattuor gerens. A. *S. scaphigera*, Wall., et *S. affini*, Mast., foliis trilobis, *S.* (*Pterocymbio*) *campanulatæ*, Wall., similibus, distincta. Folliculi lucernam antiquam forma referunt, unde nomen triviale concepi.

15. *Schoutenia ovata*, Korth.—In montibus Pra, prov. Sam rong tong, Martio, 1870. Arbor 15-20 metralis.

16. *Ixonanthes reticulata*, Jack?—En descriptio.—Foliis membranaceis elliptico-oblongis integerrimis glaberrimis margine haud incrassatis apice plerumque emarginatis utrinque lucidis 4 poll. longis basi in petiolum 4-6 lin. longum cuneatis costulis in utroque latere circ. 20 sub angulo 40° egressis arcuatis utrinque conspicue reticulatis, pedunculis ancipitibus apice parum ampliatis folia subæquantibus, pedicellis 2 lin. longis, floribus 3 lin. longis decandris, capsula ovoideo-fusiformi 17 lin. longa 5 lin. lata valvis basin versus parum exsculptis sepalis induratis 4 lin. longis circumdatis.

In ins. Phu kok, d. 29 Jan. 1874.

17. *Ventilago sulphurea*, Tulasne?—Specimina fructibus immaturis 6 lin. longis tantum prædita suppetunt, quæ optime conveniunt cum Tulasnei charactere. Folia basi conspicue inæquilatera; fructus dense cinnamomeo-tomentosi. Cum *V. calyculata*, Tul., compingit Benthamius, et nuperrimo Lawson.

18. VENTILAGO SORORIA, *sp. nov.*—Tota glaberrima, foliis anguste oblongis integerrimis basi cuneatis apice obtusissime productis lucidis venis primariis in utroque latere circ. 15 tenuissimis filiformibus secundariis crebris transversis vix tenuioribus connexis utrinque exquisite reticulatis 3½-4 poll. longis 9-12 lin. latis petiolo trilineali,

floribus in racemos paniculatos terminales aphyllos dispositis, fructu lucidulo paulo infra mediam nucem calycis limbo brevissimo acuto annulato inclusa ala lineari-oblonga obtusa sesquipollicari.

Quod ad fructum, *V. leiocarpæ*, Benth., dempto calycino limbo multo minus prominulo, ut ovum ovo similis; foliorum vero forma, numero ac tenuitate primariarum venarum, certissime distincta, et forte *V. cernuæ*, Tul., moluccensi, ceterum parum notæ, propius accedens.

19. *Vitis polythyrsa*, Miq.—Bene concordat cum charactere.

20. *Cupania pleuropteris*, Bl.—Foliola 5-6, subtus glaucescentia, parce hirtella, nec velutina. Capsula rubida, 8-9 lin. diametro.

(*To be continued.*)

SHORT NOTES.

Symphytum orientale.—My specimen of this plant is from Casterton, Rutlandshire, and was given to me in 1837 by the Rev. M. J. Berkeley. There is no note as to the kind of place in which it grew. *S. asperrimum* was first noticed as a pseudo-naturalised plant in my "Bath Flora" (p. 32) in 1834. *S. patens* we have been accustomed to look upon as little more than a purple-flowered state of *S. officinale*. If a good specimen is seen, this and *L. asperrimum* ought not to be confounded; but it often happens that good specimens are not sent when names are asked for, and time may prevent so careful an examination as such specimens require, and a name be given more carelessly than it ought to be. I fear that I have sometimes been guilty of this fault when a specimen has arrived at a very busy time, although I make it a general rule to examine such specimens with great care.—C. C. Babington.

Phleum Bœhmeri, *Wibel*, in Beds and Herts.—Mr. Blow and myself, whilst botanising in the neighbourhood of Hitchin, found *P. Bœhmeri* in Bedfordshire, near Ickleford, in great abundance. The extension of the range of this plant is interesting, as it seems fast becoming extinct in most of its recorded localities. We also noticed it within the Hertfordshire boundary close by. The stations given in the "Flora Hertfordiensis," p. 235, are "Near Hertford Union Workhouse," and "We have also several specimens in our herbarium, gathered, we believe, in a gravel-pit between Holwell and Hatfield, but unfortunately the station was not recorded when the plant was found." I do not think it has been gathered in the first-mentioned locality for some years, although it has been looked for by a botanist who knew the spot where it formerly occurred, so this is possibly the restoration of the plant to the Herts flora.—H. Groves.

Carex distans, *Linn.*, in Herts.—I have during the last month noticed this sub-littoral Sedge on two commons in the neighbourhood of Hitchin. In the "Flora Hertfordiensis" *C. distans* is recorded from Ashwell Common. This is now drained and enclosed, and I have never been able to find it there.—Thos. B. Blow.

Extracts and Abstracts.

Botanical Miscellanies. By A. Ernst. ("Botanische Zeitung," January 21st, 1876.)—*Two cases of extraordinary vitality of seeds.*—On transference of the market-place at Caracas, the old position was laid out as a public garden, and in order to this it was necessary to remove the ground at the northern end to the depth of two metres. Common tropical weeds, such as *Sida rhombifolia* and *Heliophytum indicum*, soon madetheir appearance, and where excavation had been deepest at the northern end there sprang up quantities of *Berteroa trinervata*, Pers., a plant found now only in the southern part of the country. It is unlikely that seeds of *Berteroa* were transported by the wind, for they offer but little facility for such transportation ; besides, the south wind could not have brought them, since a chain of mountains intervenes between the city and the habitat of the plant. The probability is, therefore, that the seeds were lying dormant under the market-place, the pavement of which has not been repaired for more than thirty years. The second case is that of *Capsella Bursapastoris*, found growing in great abundance, along with a quantity of spontaneous vegetation, on the waste ground surrounding an unfinished palace; this plant the author has never found during his excursions over the neighbourhood.

Duration of the life of a plant no longer remaining in connection with the ground.—A plant of *Ipomea acuminata*, R. & S., was grown in a yard, and proving a vigorous specimen it took possession of an espalier intended for *Antigonum leptopus*. It was soon after cut down, and the upper part remaining on the espalier continued to flourish, producing flowers and unripe fruits. This fact is the more remarkable since the species of this family are not noted for their long vitality.

Secretion of drops of water by Calliandra Saman.—This singular phenomenon was observed in the case of young leaves of a well-growing plant. On closer examination it was found that the glands on the underside of the petioles were beaded with little drops, which flowed off in such quantity that the ground around the plant was moistened. The capacity for secretion disappears as the leaves advance in age.

Is this to be regarded as purely excrementitious, or as a method for affording moisture to the growing plant, each gland acting as a sort of minute water-can? Possibly the right view would consort with a combination of the two suppositions.

Has the Coffee-tree dimorphic flowers?—The author has never been able to discover the small flowers which, according to Bernouilli, alone develope fruits. The normal flowers are protandrous, and freely fruit in the neighbourhood of Caracas.

The Palmella-state of Stigeoclonium. (Ueber Palmella-zustand be *Stigeoclonium*, von L. Cienkowski. "Botanische Zeitung," January 14th, 1876.—This paper contains a copiously illustrated account of the transformations undergone by the confervoid threads at the periphery of *Stigeoclonium*-growth ; these threads are at first slender and formed each of a few longitudinal cells, which by division and swelling become spherical, at the same time that a jelly-like substance is forming round them. The segments composing these altered threads are then disintegrated, and take on exactly the appearance presented by *Palmella*. Vegetative reproduction is by means of 2-ciliated zoospores, formed by conversion of the contents of the palmelloid cells. We would direct attention, in passing, to fig. 17, which shows a zoospore with four cilia, two back and two front; can this by any possibility be a zygozoospore?

The Seedling of Rhipsalis Cassytha. (Ueber die Keimpflanzen von *Rhipsalis Cassytha* und deren Weiterbildung, von T. IRMISCH. "Botanische Zeitung," March 31st 1876.)—The fact of the occasional presence of short lateral shoots, presenting the appearance of *Cereus*, on the stems of *Rhipsalis salicornioides*, must long have been familiar to growers of Cactaceæ, for this singular structure is figured by Loddiges (Cabinet, t. 369) so early as 1819. We believe, however, that the merit of pointing out its phylogenetic signification is due to Vöchting (Jahrb. fur Wiss. Bot. ix.), who observed it on old stems of *R. paradoxa*. In the paper now under notice will be found an exhaustive account of the successive appearances presented by seedling and young plants of *R. Cassytha*. Some time after germination the opened cotyledons are seen to be crowned by a fleshy mass studded with bundles of the spiny hairs so abundant in *Cereus*. In the course of the second summer the main stem becomes much elongated and tetraquetrous, the angles being occasionally furnished with bundles of spines, and immediately above the cotyledons short secondary shoots are given off. By the following summer the main stem has become more lengthened, while the secondary shoots, which present less the appearance of *Cereus* than does the main one, have developed shoots of a third order, which look still less like *Cereus*. In this way we arrive finally at the thong-like branches familiar to everybody.

All these facts point without ambiguity to the line of descent along which *Rhipsalis* has been derived; at the same time they render null a rather enticing *a priori* view that this genus may be the Cactaceous ancestor; it must now, of course, be regarded as a breaking away from the normal habit exhibited by its fellows towards the ordinary method of growth, the axis ramifying and losing its crass nature to a considerable extent. We should be glad to see taken in hand an inquiry into the early history of all the other genera of this curious family, so that the phylogeny of the group may be constructed on a firm basis. In the "Gardeners' Chronicle" for May last will be found an excellent wood-cut showing *R. salicornioides*, with its *Cereus*-like branch.

The Influence of Light on the Colour of Flowers. (Ueber den Einfluss des Lichtes auf die farbe der Blüthen, von E. ASKENASY. "Botanische Zeitung," January, 1876.)—This paper is a record of experiments undertaken to ascertain what effect is produced on the colour of flowers when the plants bearing them are completely deprived of sunlight. The subject is introduced by a short account of prior results obtained on the same field; thus

Sachs found that some plants, if placed in complete darkness, develope flowers of the normal colour and form, while in other cases a like result is obtained if, while the flower-shoots are excluded from access of light, the leaves are exposed to its influence. Sachs found, however, that sometimes the latest flowers of an inflorescence are a little affected by darkness, *e.g.*, those of a bright-red *Tropæolum majus* appear yellowish, and much the same thing is seen in the Wallflower and *Phaseolus multiflorus*, while the normally dark-red flowers of *Antirrhinum majus* are white veined with red, with a sulphur-coloured spot on the under-lip.

Sorby, working with a dark form of the Wallflower, found that by diminishing illumination the rates of the colour-producing materials are altered; scarcely any erythrophyll, found in great quantity under normal conditions, is produced, and barely a third of the proper amount of xanthophyll, while chlorophyll and lichnoxanthin are present in regular proportion.

The experiment of our author with *Tulipa Gesneriana* confirmed the result arrived at by Sachs, viz., that absence of light does not influence the colouration of this plant. A number of bulbs of this species grown in a cellar produced smaller flowers than ordinary, which were not quite properly unfolded; the scapes from these bulbs also were remarkable by reason of the difference in their length, which was sometimes greater and sometimes less than usual.

Crocus vernus.—Well-coloured flowers are formed in darkness, while the perianth-tube and flower-axis are much lengthened.

Hyacinthus orientalis.—Working with a dark violet-coloured variety, Askenasy found, as did Sachs, that the presence of light exerts considerable influence, in hastening by a fortnight the appearance of flowers. In addition it was found that the darkling flowers were less deeply coloured than were those growing in daylight, and a similar result was obtained with *Scilla campanulata.*

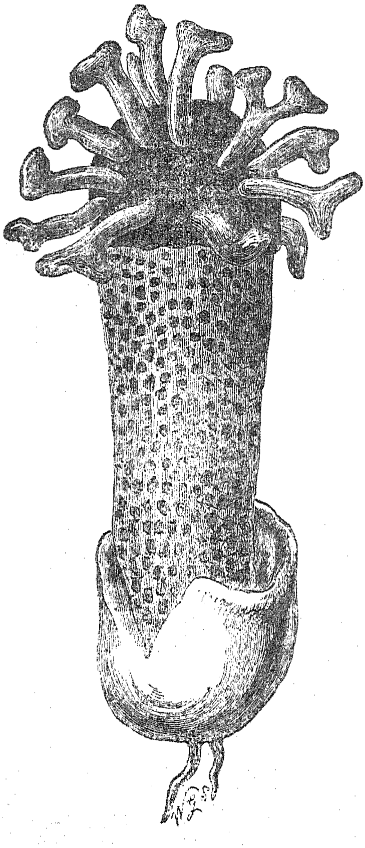
A plant already bearing open flowers of *Silene pendula* was covered over. The next unfolding flowers had petals of a paler colour, while the latest ones were nearly white, in fact like the white variety, and the red colour of the calyx which accompanies that of the corolla and is absent from the white variety was fainter in plants grown in darkness. Closely similar were the appearances presented by *Pulmonaria officinalis*, *Antirrhinum majus*, and *Prunella grandiflora*.

It is found that the flowers of some plants, *e.g.*, *Tropæolum*, *Phaseolus*, and *Cucurbita* do not develope further when the plants bearing them are brought into darkness, whilst the vegetative organs grow more vigorously under these conditions. Sachs holds that the disposition, vegetative or reproductive, which a plant assumes, depends both on the quantity and quality of the nutriment it receives; while Askenasy supposes that in order to the perfection of flowers a simple surplus of nourishment is required, and that when the amount of this is insufficient it is entirely absorbed in the production of organs of vegetation.

Without adopting either of these views, of which the validity or otherwise would, we suspect, waver from species to species, we will simply express a hope that further experiments will be instituted on this interesting subject, not only with European plants, but with tropical ones also, the selection of types being governed by reference to habit, habitat, colouration of congeners, &c.; it might also prove instructive to ascertain under what conditions, if any, white varieties will produce the colour of their normal fellows.

TWO NEW FUNGI.

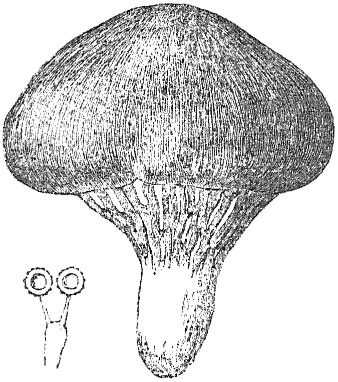
The Rev. M. J. Berkeley describes in the "Gardeners' Chronicle" for June 17th (p. 785) two very interesting new genera of Fungi, both from Africa, sent to him by Herr Kalchbrenner. Their characters are as follows:—



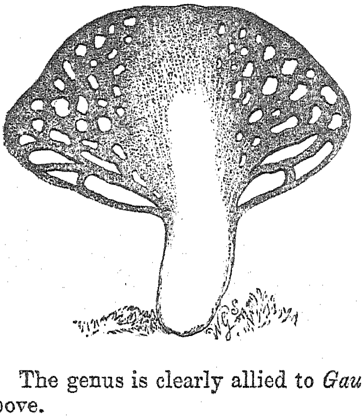
1. Kalchbrennera, *Berk.*—Receptacle hemispherical, confluent with the stem, giving off numerous radiating nail-shaped simple or forked processes, between which the hymenium is spread.

K. Tuckii, Berk.—Volva filled with fine gelatine, half immersed in the soil, $1\frac{1}{2}$ inch wide, $1\frac{3}{4}$ inch high, white, minutely furfuraceo-floccose, within slightly veined. Stem 4 inches high, fixed to the volva at the base, fistulose, wider above, clathrato-cellulose, pale waxy yellow, slightly tinged with red above. Receptacle hemispherical, divided into from 12-16 bright scarlet, nail-shaped processes, which are cylindrical or compressed below, entire above or 1-2-furcate, after the manner of the thorns of *Carissa Arduini*, Lam., the colour of which remains in the dried specimens, and between which is spread the even olive-black stratum of spores. Smell strong and extremely disagreeable. Spores minute, ovate, pellucid.

Springing up after rainy, thundery weather, and decaying in the course of twenty-foru hours, this very interesting plant has occurred three or four times in rough places of the mountain Boschberg, in East Somerset, Cape Colony, amongst Acacia thickets, where it was found by Julius Tuck, formerly Prefect of the Botanic Garden, and sent by Mr. MacOwan, Professor in Gill's College, Somerset East, a diligent collector of the Fungi in his neighbourhood. The genus is clearly quite distinct from *Lysurus*, to which it is allied.



2. MACOWANIA, *Kalchb.*—Peridium epigæous, stipitate, fleshy; stem within reaching to the apex, distinct below, surrounded above by the cavernose hymenium, which is free and decurrent below; sporophores bearing two globose, hyaline, slightly tuberculate spores.



M. agaricina, Kalchb.—Peridium hemispherical, even above, dingy, of a dirty brown, produced below into a short, stem-like, smooth white process which penetrates up to the apex of the peridium, and is surrounded above by the large cells of the hymenium, which are below much elongated and project beyond the peridium, their apertures open to the air and decurrent. Odour strong, like that of Garlic; spores rather large, globose; epispore thick, slightly tuberculate.

The genus is clearly allied to *Gautiera*, but has a distinct peridium above.

In a subsequent note (Gard. Chron., July 29th) Mr. Berkeley adds, "We have received a letter from the Rev. G. Kalchbrenner, in which he proposes to substitute for *Macowania* the generic name of *Hypochanum*." [A change is desirable, for Prof. Oliver has already published a genus of *Compositæ* under the former name.]

Notices of Books.

Australian Orchids. By R. D. FITZGERALD, F.L.S. Part I. Sydney, N. S. Wales. (Folio.)

THE author of the "Flora Australiensis," in some general remarks on Orchideæ, expresses dissatisfaction with the necessarily incomplete way in which a family so difficult to manipulate in the dry state must be worked up when there is no possibility of access to growing material, and he adds a hope that the Orchids of Australia will find a student in their native home. It is with great pleasure that we announce such a desideratum in the person of Mr. Fitzgerald, who has published at Sydney the first part, consisting of introduction, and seven folio plates with accompanying explanation, of a work designed to make known the floral structure and function, and specific and generic limitation of this group of plants. This first part we have read with much interest, and we hope that the following account may induce others to follow our example.

The genus *Pterostylis* (plates 2 and 3) exhibits a very singular method of fertilisation. In *P. longifolia* the labellum is placed on a slender hinge, and on the slightest touch it springs up towards the column. The pollinia are ensconced in a position just above the wings of the much-dilated rostellum, in such a way that an insect touching the labellum is carried against the column, and in order to get out of the flower is obliged to pass between the rostellum-wings, thus remowing the pollen-masses, which, on its alighting on the labellum of another flower, are carried against its stigma

In *Caladenia dimorpha*, a supposed new species, about which as about all similar cases we would earnestly recommend Mr. Fitzgerald to communicate with Baron von Mueller or with European authorities, we have another instance of an irritable labellum; but the action of the fertilising insect is essentially different, inasmuch as it becomes entangled in the utricular stigmatic mass, in endeavouring to escape from which, the pollinia, placed just over the stigma, are removed. Plate 5 represents the two species of *Corysanthes* (*C. fimbriata*, Br., and *C. pruinosa*, Cunn.), united by Mr. Bentham, but held to be distinct by the author; this genus has very small sepals and petals, but as a compensation a vast amount of energy is concentrated on the labellum, which is very large and has numerous appendages, though concerning the use of these Mr. Fitzgerald has nothing definite to communicate. In the case of *Acianthus*, which has a forward-arching column near the top, but on the underside of which the stigma is placed, so that pollinia removed by insect agency strike against the overhanging back portion of the column, the author believes that fertilisation is effected by small crawling insects. This brings us to the last plate, which is occupied by *Lyperanthus*, a critical genus whose floral parts possess little functional interest.

From among a number of incidental facts and inferences we select the following. *Thelymitra carnea* is fertilised in the bud, the pollen-masses crumbling upon the stigma, and the flower seldom opens and never until after fertilisation. *T. longifolia* is also in the same condition. With regard to *Aeranthus sesquipedalis*, Mr. Fitzgerald thinks that the spur may be used as a retreat or as food by fertilising insects, and a very ingenious suggestion is broached concerning *Dendrobium*, in which a caterpillar or other insect, "by devouring the top of the column, would be particularly likely to cause fertilisation, as the pollen-masses, when the division between the clinandrium and stigmatic chamber is eaten away, would be likely to fall into it." This suggestion is well-worthy of trial on other Malaxideous genera; we have ourselves been often puzzled to account for the way in which those hard, dry balls can by any possibility reach the, in most cases, very small and apparently strangely placed stigma.

Mr. Fitzgerald seems deeply imbued with the apparent discord between production and use. Thus he says, "Fertility is in an inverse ratio to the apparent arrangement for its production"; again, after mentioning *Dendrobium Hillii*, a specimen of which had 60 pseudobulbs, 190 spikes, and about 40,000 flowers, *yet not a single seed was produced*, he seems almost horrified at the "fearful waste of vital power in the production of so many barren flowers, and such an infinity of useless seed," from which he draws a corollary dealing with the vast lapse of time necessary in order to generic and specific differentiation. We think his mind would be eased, so far as concerns the application of this special corollary, could he work out a theory we have looked at with some favour, viz., that the Orchids of Australia are in a special condition, inasmuch as energy is now being directed towards vegetative as opposed to sexually reproductive existence. This is evinced by the wonderful development of tubers and roots, some of which latter organs we believe may possibly be found to be modified leaves. Thus, if this theory could be established, it would follow that the presumed waste might prove to be the better of two alternatives, the other being reproduction by ordinary sexual means, the complicated Orchidean apparatus for the performance of which remains in the form of structures uneliminated by natural selection. We also do not see why Orchidology should be set up as affording a special exhibition of the apparent absence of correlation between means and ends, for the same utterly mysterious sign is branded by Nature on all her productions. X.

On Fermentation. By P. SCHÜTZENBERGER. (Vol. XX. of Messrs. King's International Scientific Series.) London, 1876.

THE author of this work has set before himself the task of expounding the various processes to which the term *Fermentation* is applied, not treating the question simply as a chemist, but also making clear the biological facts which are causes and concomitants of those processes. It was only fitting that in so doing a series of phenomena about which, up to a quite recent period, so much mystery has hung, should be introduced by a historical account of the different views which have from time to time been expressed upon the subject. These views come under three heads. We have, first, the *Mechanical theory*, upheld by Liebig, according to which fermentation is considered to result from a molecular motion impressed on the fermenting body, this motion being derived from the decomposition of another body in proximity to it; secondly, those who supported what may be termed the *Catalytic theory* regarded fermentation as simply the result of successive acts of contact; the third, most recent, and now universally admitted view, due mainly to the genius and energy of Pasteur, may be termed the *Vitalist theory*—its formula is: Fermentation as effect, Vegetation as cause.

The historical introduction is followed by an account of the different alcoholic ferments, species of *Saccharomyces*, including the recent results of Rees, Engel, &c. into the life-history of these organisms, and an elaborate explanation of the method of obtaining the endospores of beer-yeast. These reproductive bodies, by the bye, must have been long known, since they are figured in so wide-spread a work as Hogg's "History of the Microscope," though, no doubt, their bearing on the genetic relation existing between *Saccharomyces* and other Fungi was not seen: we must add that the author does not make any mention of this relation, an omission which, in our opinion, is decidedly to be regretted. We find, next, chapters on the chemical composition of ferments; on the functions of yeast, the main result from the study of which is that yeast possesses the power of resolving the sugar which penetrates by endosmose into the interior of the cell into alcohol, carbonic acid, glycerine, succinic acid, and oxygen; and on a specially interesting and recent study, viz., the behaviour of yeast when left to itself, under which circumstances yeast-cells show a tendency to feed on their own tissues, this being evinced by a weak development of carbonic acid, while simultaneously, by a process similar to that which takes place in the animal tissues, certain of the insoluble, albuminoid substances of the yeast are broken up, with formation of acetic acid, leucine, tyrosine, sarcine, &c. In this way we arrive at the conclusion of a very full and careful examination of all the phenomena which occur during the process of alcoholic fermentation.

There are, however, other SYSTEMS of fermentation, if the expression may be allowed, *e.g.*, the transference of sugar into a viscous mass, in presence of a minute, necklace-forming, globular ferment; again, certain sugars can be transformed into an acid syrup (lactic fermentation); again, it has long been known that urea becomes broken up into carbonic acid and ammonic carbonate, and the author accepts a recently promulgated theory, that this change is induced only in presence of a Torulaceous growth. On each of these subjects we have a chapter, and the series is brought to an end by one on butyric or oily fermentation of sugar, which Pasteur holds to be a result brought about by a species of the genus *Vibrio.*

It has been discovered by Pasteur that all these fermenting processes can go without access of atmospheric oxygen, a fact the significance of which its discoverer appears to be inclined to push too far, asserting that the influence of oxygen as a nutritive factor is eliminated. But whatever view be adopted as to the function of oxygen in these cases, a well-marked line of demarcation separates them from the process termed acetic fermentation, which is a case of simple oxidation, performed through the mediation of a living organism, the *Mycoderma aceti.* The chapter on this fermentation by oxidation is followed by others purely chemical, and the work is brought to a close by a review of the "spontaneous generation" question, in which panspermist ideas are adopted.

We can strongly recommend the book to any person desiring information on this subject; in fact, there is nothing like it in the language for fullness, grasp of detail, and presentation of recent results; but while so doing we must direct attention to one or two drawbacks which, it appears to us, detract somewhat from its value. Foremost stands the readiness of the author to digress into special hobbies, the information which transpires being valuable, no doubt, but with meagre bearing on the subject in hand; as examples, we would cite the long account of the quantitative estimation of oxygen, and the whole chapter on albuminoid substances. Again, the biological phraseology is not sufficiently elastic; this we should perhaps expect, the wonder being rather that the author has come off so well, considering that he has had to treat of an alien science; we can scarcely, however, on this ground excuse the above-mentioned absence of any notice of the genetic history of ferments. For our part we believe that they are modified *mycelium* of mucorineous or similar origin, and that the endospores of yeast are homologues of the "chlamydospores" of Van Tieghem; the same thing may possibly be said for Lankester's "macroplasts," thus drawing close the tie between *Saccharomyces* and *Bacterium*.

Proceedings of Societies.

Linnean Society, *May 4th*.—G. Bentham, F.R.S., Vice-President, in the chair.—Dr. Trimen exhibited a photograph of a remarkable example of fasciated inflorescence occurring in *Fourcroya cubensis*, Haw., which had come under the observation of Dr. Ernst, of Caracas, Venezuela. The specimen is 6½ feet high and 4 feet wide (see p. 180).—Mr. Buxton Shillitoe exhibited a curious parasitic fungoid growth on a fresh specimen of Beetle larva from Australia. The nature of the former was discussed, opinions being divided as to its identity.—Some portions of Grass taken from the stomach of the Dolphin of the Ganges, *Platanista gangetica*, were exhibited in behalf of Dr. J. Anderson. These had been identified by Mr. S. Kurz, of the Royal Botanic Gardens of Calcutta, as *Ischæmum rugosum* and *Paspalum scrobiculatum*, the latter commonly known as "Kudoo" in India. During the heavy rains, when the river overfloods the paddy fields, many of the fish frequent the latter, and they doubtless, having partaken of the plants in question, and being afterwards devoured by the Dolphins, the Grass had finally become the residual digesta of the latter.—"On the genus *Hoodia*, with the diagnosis of a new species," by W. Thiselton Dyer. Three species are described—*H. Gordoni*, *H. Currori*, and *H. Barklyi*. The corona is described as double, the two whorls alternating, the author differing in this view from Mr. Bentham, who has recently examined the Asclepiads, and who considers the two sets to be connected. Mr. Bentham stated that he looked upon the coronæ in this family as mere excrescences, and not real organs, and that their number, which might be one, two, three, or variously complicated, possessed little significance.—"Report on the Fungi collected in Kerguelen Island during the stay of the Transit of Venus Expedition, 1874-5," by the Rev. M. J. Berkeley.[*] Fungi appear to be present in small numbers compared with other groups of Cryptogams.

June 1st.—J. G. Allman, Esq., President, in the chair.—Mr. Bull exhibited living plants of the Liberian Coffee, both grown from seed by him, and imported direct from Africa. Mr. J. R. Jackson showed a series of photographs of Coffee plantations and the Calcutta Botanic Gardens.—The following papers were read: "On Floral Æstivations," by the

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[*] *Agaricus Kerguelensis*, n.sp., is described at p. 51 of this Journal.

Rev. G. Henslow. The author referred to his previous paper read before the Society in which he regarded the opposite as the fundamental arrangement of phyllotaxy in Dicotyledons, and described the various modifications of imbricate æstivation. Starting from the ordinary pentastichous or quincuncial mode, in which two leaves of the cycle are external and two internal, whilst one is half outside and half in, special attention was called to the "half-imbricate" and "imbricate proper" methods, in both of which there are one external, one internal, and three intermediate leaves; the "imbricate proper" is converted into the convolute mode, in which all the leaves are intermediate, by the first leaf of the cycle being overlapped by the adjacent third leaf. The "vexillary" and "cochlear" modes, and those of many other irregular flowers such as *Cassia*, are to be referred to the "half-imbricate." The author agreed with Prof. A. Gray* in distinguishing "convolute" from "contorted." A new theory of the nature of Cruciferous flowers, which derived them from a primary type by symmetrical reduction of the parts in each whorl, was explained; and chorisis was objected to as an explanation of the pairs of long stamens. The frequency with which the corolla is found to develope subsequently to the stamens was also mentioned in objection to Pfeffer's view of the corolla of *Primula* being an outgrowth of the andrœcium.—"On Madagascar Ferns, collected by Mr. Poole," by J. G. Baker. Out of 120 species collected, no less than 30 are new; five are tree-ferns, one with curious dimorphic fronds as in *Hemitelia*. A remarkable *Lomaria* with bipinnate barren fronds, and a new *Lycopodium*, also bipinnate, are included.—"On the glands of *Acacia sphærocephala* and *Cecropia peltata*," by F. Darwin. These glands are, as is well known, food-bodies for ants; in *Cecropia* they form cushions at the base of the leaves; in the *Acacia* they are pear-like bodies at the end of the lower leaflets (there are also nectar glands on the petioles). The histology of both are identical; the *Acacia* food-bodies are compared to the serrature glands of simple leaves which have been lately investigated by Reinke.

June 15*th*.—J. G. Allman, President, in the chair.—The following botanical communications were read:—"On the superposed arrangements of parts of the flower," by M. T. Masters. Superposition is that condition of the parts of the floral whorls to which the term opposite is usually applied, and is used in contrast to alternation. It exists in numerous families. The various theoretical causes of this state were passed in review.—"On the histology and development of *Ballia*," by W. Archer. This was collected at Kerguelen Island by the *Challenger* and the Transit Expeditions. The author described the circular pits which separate contiguous cells to be closed by plano-convex "stoppers," which pass like rivets through the walls, and also explained the peculiar articulation of the joints of the rachis, the development of the branches, and the origin of the cortical investment of confervoid filaments.—"On fresh-water Algæ collected in Kerguelen Island by Mr. Moseley," by W. Archer.—"On the histology of certain species of *Corallinaceæ*," by P. M. Duncan and General Nelson. The authors have worked with specimens from Bermuda and Britain. Their researches show the presence of remarkable filamentous processes to the dermal layer, which is composed of a loose cellular envelope, permitting the existence of large subdermal areas. The more compact inner cellular structure has radiating fibres passing through it, which are modified at their joints.—"On New Zealand Ferns" (two papers), by J. H. Potts.—"Lichens from the island of Rodriguez collected by J. B. Balfour," by Rev. J. M. Crombie.—Mr. S. H. Vines gave an account of some experiments on the nature of the digestive ferment of *Nepenthes*. He considers it conclusively proved that in this plant phenomena equivalent to the digestive processes of animals obtain.

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* See Journ. Bot., p. 53.

Botanical News.

ARTICLES IN JOURNALS.—JUNE.

Bot. Zeitung.—F. W. C. Areschoug, "On two *Rubi* of Weihe" (*R. foliosus* and *R. fuscus*).—V. de Borbas, "Conspectus Dianthorum dubiorum et affinium."—R. A. Philippi, "On the Sandal-wood tree of Juan Fernandez I."—E. Reuther, "Researches on the development of flowers" (tab. 6, 7).

Flora.—J. Sachs, "On emulsion-figures and the grouping of swarm-spores in water" (tab. 10).—A. de Krempelhuber "Lichenes brasilienses" (contd.).—W. Nylander, "Lichens coll. in Egypt by Larbalestier."—C. Luerssen, "Vascular Cryptogams of the voyage of the *Donau*" (contd.).

Hedwigia.—H. F. Bonorden, "Mycological notes" (contd.).—N. Sorokin, "On the distribution of *Cronastium*."

Œsterr. Bot. Zeitschr.—R. v. Uechtritz, "Botanical notes."—V. de Borbas, "Melanthaceæ Floræ Croaticæ."—F. von. Thuemen, "Three new Austrian Fungi."—Kerner, "Distribution of Hungarian plants" (contd.)—J. Kugy, "Excursion through Oberkrain."—F. Antoine, "Botany at Vienna Exhibition" (contd.).—A. Pruckmayr, "On *Leonurus Cardiaca*, L."

Trans. Linn. Soc. Lond. (ser. 2, vol. i., pt. 3).—F. Currey, "On a collection of Fungi made by S. Kurz" (mostly in Pegu).—A. W. Bennett, "On the rate of growth of female flower-stalk in *Vallisneria spiralis*."—Id., "On the growth of the flower-stalk in the Hyacinth."—W. A. Leighton, "New British Lichens" (tab. 2).—F. Darwin, "On the hygroscopic mechanism by which certain seeds are enabled to bury themselves in the ground" (tab. 23).

Grevillea.—M. J. Berkeley, "Notices of N. American Fungi" (concluded).—Rehm, "Note on *Peziza calycina*, Schum."—M. C. Cooke, "On the same."—M. C. Cooke and J. B. Ellis, "Some New-Jersey Fungi."—Fries, "Note on Gillet's 'Champignons.'"

Bull. Soc. Bot. France (1875, pt. 3).—C. Roumeguère, "De Notaris, Hepaticæ of Borneo."—Id., "On the synonymy and area of growth of *Agaricus Palomet*, Thr."—G. de S. Pierre, "Hybrids between *Primula officinalis* ♀ and *P. grandiflora*, var. *hortensis* ♂."—Loret, "On the pedicellated bulbs of *Tulipa sylvestris*."—E. Mer, "On the dimensions of etiolated internodes and leaves."—Cauvet, "On the absorption of coloured liquids."—E. Mer, "On growth of leaves detached from the branch."—C. de Candolle, "Some cases of hairy embryos."—J. Duval-Jouve, "On *Althenia filiformis* growing with *A. Barrandonii*."—Lamotte, "Correction of name" (*Taraxacum salsugineum*, Lam. = *T. leptocephalum*, Rchb.).—E. Cosson, "Biographical notice of W. de Schoenefeld."—E. Fournier, "Revision of genus *Schoenefeldia*."—J. Duval-Jouve, "Histology of *Schoenefeldia*" (tab. 2).—Weddell, "On what is called a 'species' in Botany."—P. van Tieghem, "On the structure and mode of dehiscence of the sporange of *Pilobolus*, and on two new species" (*P. Kleinii* and *P. longipes*).—J. Duval-Jouve, "Notes on some plants collected in 1875" (Grasses).—Id., "On *Scleropoa rigida* and *S. hemipoa*."—M. Cornu, "Change in the rootlets of the Vine under the influence of *Phylloxera*."—R. Sagot, "On variation in form of seeds in *Dioclea* and *Mucuna*."—G. Rouy, "Description of five new French Roses." — Gautier, "Botanising in isles of the Etang de Leucate, near Narbonne."

(1876, pt. 1).—P. van. Tieghem, "On *Absidia*, a new genus of *Mucorineæ*."—J. Daveau, "Excursion in Malta and Cyrenaica" (with map).—M. Cornu, "Different methods of preserving microscopical preparations."—G. Genevier, "On the Mushroom eaten at Nantes under the name of Champignon rouge" (*A. campestris*).—P. van Tieghem, "On Brefeld's recent work on the *Mucorineæ*, and especially on *Pilobolus*."—F. Leclerc, "The epigenesis of the stem and elongation of the peduncle."

New Books.—D. Hanbury, "Science Papers, chiefly Pharmacological and Botanical," edited by J. Ince (Macmillan, 14s.).—T. Caruel, "L'Erborista Toscano" (Florence, 12mo.). — E. Regel, "Flora von Turkestan; I. *Primulaceæ* et *Liliaceæ*" (22 plates, Moscow, 15s.).

A second part of Baron von Mueller's notes on Papuan plants has been issued, mainly drawn up from material collected by the Rev. S. Macfarlane, a missionary who has lately explored the Baxter and Fly rivers. New species of *Macaranga*, *Spermacoce*, and *Dendrobium* are described, and there are also notes on several other plants of interest. The same botanist sends the 83rd part of his "Fragmenta." A new genus of Labiatæ, *Depremesnilia*, is dedicated to Count d'Epresmesnil, President of the French Acclimatisation Society.

The recently published part of the Transactions of the Norfolk and Norwich Naturalists' Society contains the conclusion of the catalogue of flowering plants of the county.

The death of Leopold Fueckel, of Oestrich, occurred at Vienna, on his way home from Italy, on May 8th, of typhus. He was the author of a good pocket Flora of Nassau, but is best known as a Fungologist. His "Symbolæ Mycologicæ" was published in 1869, with appendices in 1871, '73, and '75, and is a handbook to the Fungi of the Rhine district, of which such a large number of specimens have been issued in the author's "Fungi Rhenani Exsiccati."

Original Articles.

COROLLA PIERREANA;

SIVE STIRPIUM CAMBODIANARUM A CL. L. PIERRE, HORTI BOT. SAIGONENSIS PRÆPOSITO, LECTARUM ECLOGÆ;

AUCTORE H. F. HANCE, PH.D.

PUGILLUS PRIMUS, DECADES QUINQUE COMPLECTENS.

(*Concluded from p.* 244.)

21. SWINTONIA PIERREI, *sp. nov.*—Ramulis angulatis lineis elevatis e petiolorum basi decurrentibus striatis glabris, foliis petiolo 1-2 pollicari suffultis coriaceis oblongis v. oblongo-obovatis margine cartilagineis basi obtusiuscule cuneatis apice obtusissimis emarginatis 4½-6 poll. longis 1½-2 poll. latis pallide viridibus lucidis subtus glaucis opacis costa valida subtus prominula venis primariis utrinque circ. 20 angulo 60° e costa egressis venularum rete utrinque sed subtus præcipue conspicuo, drupis demum sublignosis subreniformi-ovoideis basi hinc gibbis triente superiore cicatrice stigmatica laterali notatis 1¼ poll. longis basi calyce parvo petalisque rigido coriaceis oblongis obtusis nervosis 3 lin. tantum longis stipatis, seminis loculum implentis cotyledonibus plano-convexis radicula trigono-cuneata accumbente.

Foliorum nervatura et glaucedine valde similis *S. Schwenkcii*, Teijsm. et Binn.! sed eorum forma, et præsertim petalis in fructu multo minoribus, optime distincta. *S. Griffithii*, Kurz, quam nondum vidi, ex charactere a beato detectore dato (Notul. ad pl. Asiat. Dicotyl., 412), necnon ex docti Kurzii observationibus (Journ. As. Soc. Bengal, xxxix., 75), differt foliis utrinque viridibus lucidis, atque petalis etiam multo magis ampliatis.

22. AGELÆA GLABRIFOLIA, *sp. nov.*—Scandens, ramis teretibus purpureis tenuiter tomentellis, innovationibus ochraceo-tomentosis, foliis alternis trifoliolatis longe petiolatis foliolis utrinque glaberrimis opacis oblongis integerrimis caudato-acuminatis basi trinerviis costulis reteque venularum subtus prominulis terminali 6-7 poll. longo 2½-3 poll. lato petiolulo 1½ pollicari lateralibus sæpe subobliquis circ. 4 poll. longis 2-2½-poll. latis petiolulo 3-lineali petiolo petiolulisque puberulis, paniculis parvis ramosis 2-3 fasciculatis lateralibus petiolo 4-plo brevioribus fulvo-tomentosis, sepalis fulvo-hispidis ¾ lin. longis symptyxi leviter imbricantibus, petalis oblongis sepala superantibus, staminibus 10, ovariis 5 fulvo-hispidis stylis elongatis glaberrimis coronatis.

In ins. Phu kok, sinus Siamensis, Jan. 1874. Pertinet ad quintam Hookeri filii sectionem, cujus nulla quod sciam adhuc in libris descripta sit species. Huic perperam nomen *Hemiandrinæ*, contra vocis significationem, adscripsit cl. Baillon (Hist. d. pl. ii. 4, not. 3), Hookerum male citans, *Hemiandrina* vero, ex icone (Trans. Linn. Soc. xxiii., t. 28.), nostræ stirpi aspectu similis, quartam sectionem repræsentat, abs qua, jam adsentiente Miquelio (Ann. mus. bot. Lugd.-Bat. iii., 88) *Troostwyckia* non differt.

23. Afzelia (*Intsia*) cambodiensis, *sp. nov.*—Ramulis glaberrimis, foliis abrupte bijugis petiolo subpollicari glaberrimo foliolis membranaceis uno latere basi secus petiolulum tortum 1½ linealem oblique productis ovalibus apice emarginatis utrinque prominulo-reticulato-venosis sub lente pellucido punctatis subtus secus costam tomentosis ceterum glaberrimis 2-2½ poll. longis 16-21 lin. latis, racemis folio brevioribus corymbosis flexuosis glaberrimis 5-12 floris, pedicellis 2-5 lin. longis, bracteis bracteolisque caducis, calycis tubo angusto 4 lin. longo segmentis 4 subcoriaceis æquilongis cochleatis late oblongis obtusis duobus exterioribus paulo latioribus glabrescentibus interioribus extus passim et intus apicem versus sericeis 4 lin. longis, petali unici (purpurei ?) ptyxi complicato-inflexi longe unguiculati ungue tomentoso limbo late quadrato crispulo, staminum 3 ptyxi complicato-inflexorum filamentis pilosis petalum duplo superantibus, staminodiis 3 brevibus uno nunc antherifero, ovario stipitato antice præsertim tomentoso stylo petalum superante, legumine . . . ?

Ab *A. bijuga*, A. Gr., foliolorum forma, floribus simpliciter racemosis, petalo longius unguiculato, staminodiis tantum 3, ovarioque stipitato differt. *Intsia palembanica*, Miq., et *I. puberula*, Miq., præter alia, foliolis 4-5 jugis discedunt. Propior forte *A. retusæ*, Kurz, ex insulis Andamanicis (nimium breviter descriptæ), sed ab hac bracteolis caducis, et florum colore, quantum ex exsiccatis dijudicare liceat, discrepare videtur. Deinque, *Pahudia insignis*, Teijsm. (*Intsia amboinensis*, Miq., vix Thouars), quæ ex charactere manifesto stirpi nostræ finitima, inflorescentia paniculata petaloque brevi-unguiculato calycis lobos haud superante differt. Genus *Macrolobium*, præter bracteolas majores, plus minus persistentes (in *A. retusa* etiam persistentes), ne minima nota discernendum, ab *Afzelia* nullo pacto segregandum; species enim sectionis *Intsiæ* a typicis *Afzeliis* ex Africa tropica magis recedunt quam a *Macrolobiis* americanis. Nomen Smithianum, meritissimum professorem et viatorem memorans, me judice servandum.

24. Parkia streptocarpa, *sp. nov.*—Petiolo communi subangulato fulventi-tomentoso paulo supra basin glandula ovoidea notato subpedali, pinnarum 6-10 jugarum oppositarum petiolo supra plano subtus carinato angustissime marginato glandula umbilicata inter singulum foliolorum par exceptis tribus inferioribus, foliolis 15-20 jugis oppositis sessilibus late linearibus obtusissimis leviter oblique emarginatis basi oblique truncata deorsum paulo magis producta tenuiter penninerviis supra fusco-cinereis venis pallidis arcuatim anastomosantibus pictis subtus æquabiliter albidis subtilissime impresso-punctulatis præter costam supra strigillosam marginemque ciliolatam glaberrimis 9 lin. longis 3-lin. latis, pedunculis subcompressis striato-sulcatis 25-36 poll. longis apicem versus fulvo-tomentellis ceterum glabris, floribus in capitulum turbinato-globosum vix v. breve stipitatum 1¼ poll. longum densissime coacervatis, bracteolis apice dilatato extus

aureo-tomentosis, leguminibus sublignosis linearibus apice acutis basi longe attenuatis suturis incrassatis pendulis atris nitidis glabris subtiliter impresso-punctatis 9-15 poll. longis 10-11 lin. latis stipite 2-3 pollicari arcuatim recurvato suffultis more *Pithecolobiorum* arcte spiraliter tortis 10-20-spermis, seminibus nigris compressis pulpa spongiosa farinosa pallida involutis.

In ins. Phu kok, sinus Siamensis. Forte *P. insigni*, Kurz, e Martabania, cujus fructus ignotus, propinqua, sed ab hac foliis subtus glaberrimis albidis aliisque discedit notis, et a speciebus omnibus hucusque descriptis legumine valde contorto distincta videtur. Capitula tantum juniora floribus nondum extra bracteolas emersis possideo.

25. *Dichroa febrifuga*, Lour.?—Foliorum forma et constantia speciminibus Hongkongensibus accedit; panicula elongata (5 poll. longa) floribusque duplo minoribus ab iis recedit. Specimina Khasiana foliis firmioribus basi obliquis minus attenuatis, paniculis abbreviatis magis corymbosis, calycisque phyllis longioribus differunt. Forte plures species distinguendæ, ut jamdudum subjeci (Ann. sc. nat. 5e. sér., v., 214.) contra recentiorum judicium.

26. TRISTANIA (*Eutristania*) RUFESCENS, *sp. nov.*—Ramulis inflorescentia petiolis calycibusque dense albo-hirsutis, foliis sparsis alternis crasse membranaceis spathulato-obovatis obtusis 1½-2½ poll. longis 8-12 lin. latis creberrimo pellucido-punctatis novellis supra albo-pilosulis maturis præter basin glabratis lucidulis subtus dense rufo-tomentosis costa conspicue prominula nervulis tenuibus deorsum arcuatis utrinque elevatis basi in petiolum marginatum 3-4 linealem cuneatis, cymis pedunculo compresso fultis confertim multifloris folio triplo brevioribus, pedicellis calyci æquilongis, hujus tubo obconico dentibus brevibus distantibus triangulatis, staminum phalangibus 6-andris petalis rotundatis eroso-denticulatis puberis æquilongis, filamentis puberulis, ovario cum calycis tubo intus albo-hirsutissimo, stylo glaberrimo, stigmate capitato.

In ins. Phu kok, sinus Siamensis, a. 1874. Affinis *T. obovatæ*, R. Br., et præcipue *T. burmannicæ*, Griff. (Plant. Cantor 49), sed ab omnibus sectionis speciebus foliis subtus rufo-tomentosis egregie distincta. Inter neo-caledonicas *Tristaniopsi Vieillardii*, Brongn. et Gris! tantum habitu accedit.

27. *Eugenia* (*Syzygium*) *leptantha*, Wt.—*Jambosa clavata*, Korth., et *J. borneensis*, Miq. (*Eugenia rhododendrifolia* forme *longifolia*, Miq. Anal. bot. ind. i., 20, t. 3) certe huic sectioni adnumerandæ. Si calycis limbum majorem, profundius partitum, persistentem, excipias, grex *Jambosarum* vix a *Syzygiis* distinguendus.

28. *Crypteronia Wallichii*, A. DC.?—Folia iis *Viburni venulosi*, Benth., non dissimilia, elliptica, acumine obtuso, siccitate flavescentia, crasse membranacea, costa nervisque primariis quam in *C. glabra*, Endl., multo crassioribus, subtus prominulis, paniculæ femineæ dense multifloræ, incluso pedunculo communi 8-9 pollicaris, folia superantis, racemis 8-10, pubescentes, capsula cinereo-velutina, incl. stylo 1¼ linealis.

29. *Sarcocephalus subditus*, Miq.?—Arbor 15-20 metralis, in montibus Kwang Repen, prov. Tpong, Cambodiæ, alt. 1500 metr., Maio, 1870, visa. Specimina incompleta, suadente amico Thwaites

forte hic, forte *S. cordato*, Miq., suspicante cl. Oliver, referenda. Folia ovato-elliptica, obtuse acuminata, basi conspicue cuneata, nequaquam cordata.

30. Bassia ? ? Krantzii, *sp. nov.*—Dioica v. polygama ?, ramis validis fusco-brunneis glaberrimis cicatricibus magnis foliorum delapsorum undique notatis, innovationibus fulvo-sericeis, foliis glaberrimis obovatis basi cuneatis apice obtusissimis margine undulatis supra sublucidis subtus pallentibus opacis sub lente minute impresso glanduloso-punctatis costa valida fusco-cinerea costulisque conspicuis fulventibus utrinque circ. 13 angulo circ. 60° egressis juxta marginem arcuatim unitis subtus prominulis venulis transversis supra tenuiter impressis subtus inconspicuis 5½-9 poll. longis 2½-5 poll. latis petiolo 1¼-1½ poll. longo subtiliter fulventi-tomentello, pedicellis 3-4 nis 4-5 lin. longis cum calyce fulvo-tomentellis, alabastris more *Xylopiarum* trigonis, calycis tripartiti lobis coriaceis æqualibus triangulatis acutiusculis symptyxi valvari, petalis 6 cochleatis ovatis 3 exterioribus majoribus extus fulvo-velutinis dorso bicarinatis margine scariosis 3 interioribus paulo minoribus glabris symptyxi ut videtur torsiva, antheris 12 biseriatis dorso fulvo-hispidis apiculatis stylo arcte adpressis, stylo simplici subulato stigmate penicillato terminato, ovarii vestigio vix ullo plano torum v. pedicelli apicem incrassatum vestiente et quasi ei immerso.

In silvis Cochinchinæ atque Cambodiæ. Specimina *Isonandræ argentatæ*, Teijsm. et Binn., non dissimilia aspectu. Substantiam vulgo *Gutta Percha* dictam præbet; pedicelli organaque floralia, in sicco etiam, post macerationem, succo lacteo in filas ductili scatent. *Isonandra Krantzii*, Pierre, in schedis, sed a charactere essentiali omnino abhorret; et præterea, *Isonandra*, docente amico Thwaites, melius cum aliis generibus vulgo admissis *Bassiæ*, typos plures numero partium floralium tantum inter se diversos et vix generice separandos complectenti, referenda. Interea, albastris floris ut videtur masculi v. imperfecte feminei a me tantum examinatis, fructuque adhuc ignoto, plantam maxime singularem *Bassiæ* adscripsi, sed vix dubie typum sistit generis novi et distinctissimi, quod lubens Pierreæ nomine salutarem.

31. *Neuropeltis ovata*, Wall.

32. *Sphenodesma Jackiana*, Schauer.—In insula Phu kok, sinus Siamensis, juxta Cambodiæ oras. Cum accuratissimo b. Schauerii charactere omnibus numeris convenit.

33. *Helicia serrata*, Bl.?—Perigoniis 4-5 lin. tantum longis, squamisque hypogynis e ciliatis a diagnosi Meissneriana recedit; ceterum bene congruit, et vix distinctam existimo. Folia iis *H. robustæ*, Wall., simillima.

34. *Baccaurea ramiflora*, Lour.?—Fructum modice gratum ipse Saigone comedi. Vulgo et late colitur, sed etiam agrestis occurrit frutex.

35. Aporosa tetrapleura, *sp. nov.*—Ramis subangulatis striatis glaberrimis fusco-castaneis, foliis rigide coriaceis 3-3½ poll. longis 1½ poll. latis oblongis integerrimis basi obtuse cuneatis biglandulosis apice obtusis retusulis supra in sicco more *Symploci* flaventibus subtus griseo-pallentibus punctisque subpellucidis inconspicuis consitis nervis subtus prominulis petiolo angulato glaberrimo 6-8 lineali, inflore-

scentiis femineis sessilibus 1-3-nis, fructibus sessilibus ovoideis glaberrimis basi obtusis apice acutiusculis paululum compressis costulis 4 tenuibus æquidistantibus percursis 6 lin. longis, stigmatibus sessilibus ad basin usque partitis.—Specimina fem. fructifera tantum adsunt. Valde affinis *A. microcalyci*, Mull. Arg., sed omnium partium glabritate, foliorum colore, fructibus nervatis distincta.

36. Daphniphyllum Pierrei, *sp. nov.*—Frutex 2-4 metralis foliis sub quaternatim verticillatis chartaceis glaberrimis lucidulis reticulato-venosis oblongo-lanceolatis basi obtusis apice minute calloso-apiculatis 17-25 cm. longis 5-8 cm. latis petiolo 5-7 cm. longo, racemis masculis subfasciculatis 3 cm. longis, pedicellis divaricatis fere 2 cm. longis, laciniis calycinis 3 mm. longis inæqualibus oblongis acutis glaberrimis, antheris 7 sessilibus a dorso compressis calyci æquilongis, fl. fem. . . . .?

In ins. Phu kok, sinus Siamensis, m. Januario, 1874. Proximum videtur *D. calycino*, Benth., et *D. bancano*, Kurz.

37. *Gironniera chinensis*, Benth.—Perianthium fem. 5 partitum. Stylus $1\frac{1}{2}$ lin. longus. Cum stirpe Hongkongensi, a cl. Planchon pro varietate brevistyla *G. subæqualis* habita, certe conspecifica.

38. *Taxotrophis javanica*, Bl.—Hucusque, ut videtur, in insula Java tantum reperta.

39. *Conocephalus ellipticus*, Tréc. ?—Cum diagnosi brevi bene congruit.

40. Aristolochia (*Diplolobus, sessiles*) arenicola, *sp. nov.*—Caule flexuoso sulcato angulato sparsim piloso, foliis brevipetiolatis ovali-oblongis obtusissimis margine repandulis basi excisis sinu obtuso angusto auriculas breves rotundatas conniventes separante pedatim 7-nerviis supra glabris subtus hirsutis, floribus axillaribus solitariis, pedicellis 7-9 lin. longis hirtellis, perigonii fulventi-hispidi 15 lin. longi utriculo globoso tubo rectiusculo apice acuto.

Ad radices montis Cheren, Cambodiæ, m. Martio, 1873. Specimina satis male exsiccata, unde ampliorem floris adumbrationem præbere haud potui. Species tamen manifeste nova, pone *A. contortam*, Bge. ! collocanda, sed nulli adhuc descriptæ arcto jungitur connubio.

41. *Henslovia frutescens*, Champ.

42. *Dacrydium elatum*, Wall.

43. Oncosperma cambodianum,* *sp. nov.*—Frondium rachi dense ferrugineo-furfuracea a medio ad basin aculeis complanato-acicularibus nigricantibus armata supra medium segmentis 20-22 suboppositis v. alternis anguste lanceolatis acuminatissimis $4\frac{1}{2}$-$6\frac{1}{2}$ poll. longis 6-9 lin. latis nervo medio supra parum prominulo subtus parce squamuloso omnibus sursum directis sub angulo circ. 30° egressis, spadicis ramis subternis (?) 12-15 poll. longis densifloris, floribus distichis, fructu globoso in sicco minutissime elevato-puncticulato $5\frac{1}{2}$ lin. diametro stigmatis excentrici cicatrice coronato, albumine eximie ruminato.

Mancum modo suppetit specimen, floribus masculis spathisque orbatum; species vero a tribus quæ jam innotuerunt quarumque diagnosticos nuper clare exposuit characteres amicus Dr. Scheffer

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Vox σπέρμα est neutrius, nec feminini, generis, uti perperam scripserunt Blume, Thwaites, et Scheffer.

(Sur quelques Palmiers du groupe des Arécinées, 41-44), certe diversa, frondis segmentorum directione aliisque notis recedens.

44. XYRIS CAPITO, *sp. nov.*—Radicibus fibrosis, scapis glaberrimis subcompressis sulcatis fistulosis 2-2½ pedes longis, foliis planis linearibus subflaccidis glaberrimis multinerviis 3 lin. latis acutiusculis scapo triplo brevioribus eumque Graminum more longe vaginantibus, capitulis elongato-ovoideis 16-lin. longis multifloris squamis obovatis rotundatis nitide castaneis superne impresso-puncticulatis subglaucescentibus subopacis 4½ lin. altis apice 3½ lin. latis, sèminibus ovoideo-oblongis hinc apiculatis costulis muriculatis verticaliter notatis.

In inundatis Cambodiæ atque Cochinchinæ. Specimina omnia insignis speciei capsulas jam dehiscentibus prædita quapropter floris structuram investigare non potui.

45. *Asplenium tenerum*, Forst.

46. *Oleandra neriiformis*, Cav.—In summo monte Kam chai.

47. POLYPODIUM PIERREI, *sp. nov.*—Rhizomate abbreviato cæspitoso paleis clathratis olivaceo-ferrugineis lanceolatis acutis fulvido-setosis vestito, foliis multifariis crassiuscule coriaceis supra glabris subtus sparsim ferrugineo-hirtellis petiolo brevissimo ferrugineo-hispido lamina 4½-7 poll. longa 8 lin. lata lanceolato-lineari ad duas tertias fere latitudinis pinnatifida laciniis numerosis oblique adscendentibus e basi latiori oblongis integerrimis obtusis vel acutiusculis basi decurrentibus utrinque sensim decrescentibus inferne in alam integram decurrentibus costa crassiuscula nerviis indivisis catadromis utrinque 4-6 apice vix incrassatis opacis, soris terminalibus inter costulam et marginem mediis omnino immersis, foveola supra vix perspicienda, paraphysibus nullis.

P. lasiostipiti, Mett.!, *P. mollicomo*, Bl., cet. præcipue affine, sed ab omnibus hujus agminis speciebus mihi notis constantia foliorum, incisura eorumdem minus profunda, aliisque notis dignoscendum.

48. *Polypodium sinuosum*, Wall.—Præter stationes a clar. Baker in priori editione "Synopsis Filicum" datas, specimina vidi ex insulis Philippinis et ex Formosa.

49. *Schizæa digitata*, Sw.

50. *Schizæa Forsteri*, Spr.—Ad litora marina ins. Phu kok, sinus Siamensis, Januario, 1874.

NEW LICHENS FROM THE ISLAND OF RODRIGUEZ.

By the Rev. J. M. Crombie, F.L.S.

In the comparatively large collection of Lichens made in the above Island by Dr. I. B. Balfour, during the stay of the Venus Transit Expedition, there occur various interesting novelties, of which, previous to a more detailed report, I here give the following short diagnoses:—

1. *Cladonia Balfourii*, Cromb.—Basal squamules white-glaucescent, somewhat firm, crenate (K+yellowish); podetia very short,

white- or greenish-white- pulverulent (K—); apothecia small, brown, but not seen rightly developed. On rotten stumps of trees.

2. *Usnea dasypogoides*, Nyl.—Somewhat similar to *U. dasypoga* but having the thallus sub-yellowish, smooth, glabrous, and only in the ramules or fibrillæ slightly setulose. Apothecia not seen. On the trunks and branches of trees.

3. *Pyxine petricola*, Nyl.—Thallus glaucescent, diffuse (K—), laciniæ subintricately contiguous, adnate; apothecia black, plane, lecideine, margined; spores 8næ, blackish, oblong, bilocular; epithecium bluish-black, hypothecium nearly colourless. On rocks.

4. *Pannaria luridula*, Nyl.—Thallus lurid, squamulose, the squamules crenate or crenato-lobulate, subintricate; apothecia testaceo-reddish, lecanorine, with thickish, crenate thalline margin; spores ellipsoid.

5. *Heppia Rodriguesii*, Cromb.—Thallus nearly similar to that of *Lecanora cervina* (Pers.); apothecia small, reddish flesh-coloured, concave, innate; spores numerous, shortly ellipsoid, paraphyses slender; syngonimia usually small, and containing but few gonimia. On rocks.

6. *Lecanora aurantiella*, Nyl. — Subsimilar to *L. aurantiaca* * *erythrella*, but with smaller and innate apothecia and smaller spores. On rocks.

7. *L. glaucofuscula*, Nyl.—Thallus glaucous-greyish, thin, continuous, subrimose; apothecia small, brown, subinnate, plane, with thin thalline margin; spores 8næ, colourless, placodine; epithecium K purplish, hypothecium colourless.

8. *L. apostatica*, Nyl.—Thallus whitish, thin, areolato-rimose, hypothallus bluish-black; apothecia black, lecideine, plane, margined, whitish within; spores 8næ, colourless, placodine; spermogones with arthrosterigmata. On rocks.

* *L. obliquans*, Nyl.—This differs in having the thallus greyish, very thin, continuous, and the epithecium being often white-suffused. Also saxicole.

9. *L. carneofusca*, Nyl.—This species approaches to *L. camptidia*, Tuck., from which, amongst other marks, it differs more especially in having the thallus areolato-rimulose, and the spores somewhat larger.

10. *L. achroa*, Nyl.—Thallus glaucescent, rugulose, at length rimose (K yellow); apothecia pale-yellowish, plane, superficial, the thalline margin more or less crenated; spores 8næ, ellipsoid; epithecium granuloso-inspersed; spermatia slightly arcuate. On the bark of trees.

11. *L. achroella*, Nyl.—Thallus glaucescent, smoothish, rimulose (K yellowish); apothecia pale-yellowish, plane, subinnate, minute, the thalline margin thin, entire; spores 8næ, ellipsoid; epithecium scarcely inspersed; spermatia arcuate. On the bark of trees.

12. *L. perlutescens*, Nyl. — Allied to *L. lutescens* (DC.), but, amongst other differences, distinguished by the smaller, more determinate thallus and by the smaller spores. Thallus and apothecia K + red or orange; spermatia arcuate. Corticole.

13. *L. conizæpta*, Nyl.—Thallus white, thin, opaque, rimulose (K yellow); apothecia yellow flesh-coloured or yellowish-red, subinnate, plane, thalline margin uneven, depressed; spores 8næ, ellipsoid, simple. Corticole.

14. *L. subflavicans*, Nyl.—Thallus whitish or yellowish-white, thin, granuloso-unequal (K yellow); apothecia testaceo-yellow or pale testaceous, thalline margin thickish, or at length entire; spores 8næ, colourless, ellipsoid; epithecium inspersed. Corticole.

15. *Pertusaria impallescens*, Nyl.—Thallus whitish, opaque, continuous, thinnish, somewhat smooth, rimose (K—); apothecia colourless, 1-4 innate in depresso-convex thalline tubercules, the ostioles black, punctiform; spores 8næ, colourless; spermatia aciculari-fusiform.

16. *Lecidea achroopholis*, Nyl.—Thallus pale, squamulose, the squamules adnate, more or less contiguous, somewhat lobulate or crenate at the circumference (K—); apothecia black, plane, margined; spores 8næ, colourless, oblong, normally simple; epithecium and hypothecium somewhat purplish. On rocks.

17. *L. coccocarpioides*, Nyl.—This peculiar species presents externally the appearance as it were of *Coccocarpia molybdæa*, but the thallus is somewhat subshining, is not concentric on the surface, and otherwise is gonidic. Apothecia black, innate, plane, immarginate, sometimes 2-3 confluent, dark within; spores 8næ, ellipsoid or oblong, 1-septate. On rocks.

18. *L. melopta*, Nyl.—Thallus white, thin, areolate (K yellow), hypothallus black; apothecia black, usually singly innate in the areolæ, plane, immarginate; spores 8næ, colourless, ellipsoid; paraphyses not distinct. Belongs to the section of *L. plana*. On rocks.

19. *L. immutans*, Nyl.—Thallus ochraceo-rose-coloured, areolato-diffract, determinate (K yellow); apothecia small, black, superficial, plane, obtusely margined, concolorous within; spores 8næ, brown, ellipsoid, 1-septate; paraphyses slender. On rocks.

20. *L. continens*, Nyl.—Thallus cream-coloured or yellowish-white, thinnish, continuous, areolato-rimulose on the surface (K yellow, medulla I dark-bluish); apothecia black, plane, margined, dark within, the margin brownish; spores 8næ, brown, ellipsoid, 1-septate; paraphyses nearly moderate. On rocks.

21. *L. configurans*, Nyl.—Thallus yellowish-glaucous-white, smooth, subrimulose, determinate (K yellowish); apothecia dark-brown, innate, circumcised, at length 2-6 submoniliformly confluent; spores 8næ, colourless, oblong, simple. Belongs to the section of *L. lævigata*.

22. *Opegrapha difficilior*, Nyl.—Thallus whitish, macular; apothecia black, linear, subsimple, straight or subflexuose, superficial; epithecium rimiform; spores 8næ, fusiform, 5-7-septate; spermatia thin, somewhat straight. On decaying stumps of trees.

23. *Arthonia phylloica*, Nyl.—Thallus white, macular; apothecia black, thin, erumpent, linear, somewhat simple or subastroid; spores 8næ, colourless, oblong, 3-septate, minute. Foliicole.

24. *A. dendritella*, Nyl.—Thallus greyish-white, macular; apothecia blackish, thin, innate, somewhat dendritrically divided or simpler; spores 6-8næ, colourless, oviformi-oblong, 3-septate. Corticole.

25. *Glyphis tricosula*, Nyl.—Thallus white, very thin, blackish-limited; apothecia black, sub-cæsio-pruinose, dendroideo-divided, sparingly-branched; spores 8næ, oblong, 4-locular. Corticole.

26. *Verrucaria 5-septatula,* Nyl. — Thallus whitish, macular; apothecia with the pyrenium entirely black, above denudated, convex; spores 8næ, colourless, fusiform, 5-septate, small; paraphyses slender, not crowded. Corticole.

ON A NEW XIPHION AND CROCUS FROM THE CILICIAN TAURUS.

By J. G. Baker, F.L.S.

Mrs. Danford, of Broomhall Bank, Banchory, Aberdeenshire, who accompanied her husband in the spring of the present year upon an ornithological expedition to the Cilician Taurus, took the opportunity of making a collection of the spring flowers of the mountains, and upon her return to England a few weeks ago gave me an opportunity of looking through it. All the collections from the district which I have seen before, such as Kotschy's and Balansa's, were made at a later period of the year. Mrs. Danford's collection includes several plants of great interest, especially amongst the smaller bulbs. Amongst these, of plants already described, I may mention *Fritillaria aurea,* a fine species with broad leaves and bright yellow flowers with small, nearly black tesselations, discovered long ago by Kotschy and recently brought into cultivation in this country (see "Gardeners' Chronicle," 1876, p. 720), but of which, so far as I am aware, no wild specimens have previously reached England; amongst the Hyacinths *Bellevallia lineata* and *hispida* and *Muscari lingulatum,* the latter only known from poor specimens of Aucher-Eloy's, not specially localised; *Ornithogalum lanceolatum, Ixiolirion montanum,* a variety of *Sternbergia lutea; Crocus Fleischeri,* which will very likely prove to be the imperfectly-described *C. candidus* of Dr. Clarke's "Travels," from the Troad; three other species of Crocus, which, so far as I can judge without bulbs, are probably *vitellinus, chrysanthus,* and *biflorus,* and a fifth tiny new species, allied to *C. Sieberi,* which I will describe presently.

By far the most interesting plant in the collection is a new bulbous Iris, very like *persica* in its general habit, with the same solitary flower with a long tube nearly stemless in the centre of the basal rosette of leaves, but the perianth bright orange-yellow instead of lilac, with the three inner segments entirely suppressed, and the three outer with a faint beard down the claw. These last two characters may be safely held to mark it as constituting a new section of the genus *Xiphion,* if not a new genus. The following is a technical description of the plant:—

Genus Xiphion (Tournef.), Miller.

Subgenus Micropogon. — Perianthii segmenta interiora prorsus obsoleta; interiora unguibus obscure barbatis.

X. Danfordiæ, *Baker.*—Bulbus ovoideus, 6-8 lin. longus, 3-4 lin. crassus, tunicis brunneis membranaceis, fibris radicalibus carnosis, collo hypogæo 2-3 poll. longo. Folia radicalia 2-3 post florescentiam producta, anguste linearia, glabra, falcata, 1½-2 lin. lata, facie canaliculata. Scapus subnullus. Spathæ valvæ 2, lineares membranaceæ, 1½-2-pollicares. Ovarium cylindricum, 6-7 lin. longum, pedicello intra spatham ovario æquilongo; tubus protrusus, 1½-pollicaris; limbus infundibularis, pollicaris, aurantiaco luteus, segmentis (exterioribus) oblongo-spathulatis supra medium 3-4 lin. latis, lamina oblonga reflexa ungue breviore fauce nigro punctata, ungue obscure barbato. Stigmata lutea immaculata, limbo paulo breviora, cristis deltoideis. Stamina 6 lin. longa, antheris oblongis citrinis filamento longioribus.

The following are Mrs. Danford's notes upon the plant:—

"This plant is an inhabitant of the Cilician Taurus, abundant where it occurs, but evidently very local, we having only met with it twice. It blooms at the beginning of March (the specimens were picked on the 24th of Marsh, when most of the others were faded), at an elevation of about 4000 feet. It is one-flowered, each plant growing apart from the others. When it blooms it has only narrow sheathing leaves, and is from two to four inches high. The exact locality in which we found it was the northern side of the Anaxlia Mountain—a mountain which is in reality a continuation of the Ala Dagh range, resembling it in formation and merely divided from it by the deep ravine through which flows the Sihoun. At the base of the rocks near the village of Anascha is one of the many springs which occur on the mountain side. This spring is called Pongar Halil Ogdu (Spring of the Son of Halil). There, on the slope of sandy earth, grows the yellow Iris, in close company with a brilliant orange Crocus. The banks of the little rivulet are patched with beds of Primroses, Violets, and the beautiful blue blossoms of *Scilla bifolia;* and on the rocks from which the water gushes are tufts of *Cystopteris fragilis, Asplenium Trichomanes,* and *A. Ruta-muraria.*"

The following is a description of the new Crocus, which will have to be placed amongst the vernal species of the section *Holostigma,* next *C. Sieberi,* of Gay, Bot. Mag., t. 6036 (*C. nivalis,* Bory & Chaubard), the common species of the mountains of Greece.

C. PARVIFLORUS, *Baker.*—Bulbus ovoideus, 5-6 lin. crassus, tunicis exterioribus prorsus subtiliter fibroso-reticulatis. Folia 3-4, synanthia, erecta, anguste linearia, tempore florationis perianthii tubo æquilonga, ½ lin. lata, distincte albo vittata, marginibus glabris revolutis. Scapus hypogæus, 1-1½- pollicaris, unifloris. Spathæ valvæ 2, lanceolatæ, albæ, membranaceæ. Perianthii tubus protrusus, sordide lilacinus, 10-12 lin. longus; limbus infundibularis, albidus lilacino tinctus nullo modo striatus, segmentis oblongis obtusis imbricatis 2-2½ lin. latis, fauce concolori glabro. Stamina perianthio vix breviora, filamentis glabris citrinis, 2 lin. longis, antheris aurantiaceis 3 lin. longis. Stigmata integra, brevia, erecta, aurantiaca, antheris breviora, apice cuneata fimbriata.

NEW ARISTEÆ AND SISYRINCHIA.

By J. G. Baker, F.L.S.

Aristea madagascariensis, *Baker*.—Cæspites foliorum aggregati. Folii radicales graciles duri. Folia dura, anguste linearia, erecta, 4-6 poll. longa, 1-1½ lin. lata, crebre nervata. Caulis gracilis, anceps, pedalis et ultra, foliis paucis reductis præditus. Inflorescentia laxe spicata, 2-5 poll. longa, spathis alternis 3-8, valvis exterioribus viridulis lanceolatis, reliquis brunneis lanceolatis 3-4 lin. longis. Perianthii limbus 5-6 lin. longus, segmentis lanceolatis. Stamina limbo triplo breviora, antheris luteis 1½ lin. longis. Capsula obovoideo-oblonga, 3 lin. longa, sessilis, lateralibus rotundatis. *Madagascaria in montibus;* Lyall, 197! 224! Herb. Blackburn! Agrees in capsule with the Cape *A. anceps* and *A. schizolæna*, Harv. MSS. A plant in Schimper's Abyssinian collection of 1863-8, numbered 279, of which I have only seen an indifferent example in fruit, is not distinguishable from *A. anceps*.

A. schizolæna, *Harv. MSS.*—Folia radicalia dense cæspitosa, linearia, pedalia, 3-4 lin. lata, crebre striata. Caulis anceps, pedalis vel sesquipedalis, foliis pluribus plus minus reductis præditus. Inflorescentia, spicata, 3-5 poll. longa, spathis 4-8 alternis multifloris, valvis exterioribus viridulis, 3-4 lin. longis, interioribus multis brunneis scariosis. Perianthium cæruleum, 5-6 lin. longum. Capsula sessilis, obovoideo-oblonga, 2½-3 lin. longa, obtusa, lateribus rotundatis. *C.B. Spei in clivis umbrosis prope Grahamstown;* McOwan, 195! *Kaffraria transkeiana in clivis montis Baziya, alt.* 2500 *pedes;* Rev. R. Baur, 447! This, with *A. anceps* and *madagascariensis*, constitute a section of the genus well-marked by a small sessile turgid capsule and globose seeds.

A. juncifolia, *Baker*.—Dense cæspitosa, fibris radicalibus duris copiosis gracilibus. Folia subteretia, rigida, erecta, semipedalia, 1½ lin. lata, griseo-viridia, apice subpungentia, crebre striolata. Caulis simplex anceps, flexuosus, semipedalis et ultra, spathis pluribus alternis, valvis exterioribus oblongo-navicularibus, 6-9 lin. longis, firmis, apice tantum scariosis. Perianthii limbus cæruleus, 6 lin. longus. Capsula immatura cylindrica, acute angulata, 6 lin. longa, pedicello 6 lin. longo. *C. B. Spei;* Admiral Sir. J. Grey! Dr. Jhan, 1005! A well-marked species, allied to *A. capitata*, Ker, Bot. Mag., t. 605.

A. racemosa, *Baker*.—Folia radicalia dura, teretia, 9-12 poll. longa, ½ lin. lata, griseo-viridia. Caulis pedalis et ultra, anceps, foliis 3-4 parvis, superioribus bracteiformibus et ramis pluribus brevibus erecto-patentibus præditus. Spathæ valvæ oblongæ, 3-4 lin. longæ, omnis plus vel minus membranaceæ, pallidæ. Perianthium cæruleum, 4 lin. longum. Capsula 6 lin. longa oblonga, dura, acute triquetra, pedicello circiter 1 lin. longo. *C. B. Spei;* Drege! (sub nomine *Witseniæ spicatæ*, E. Meyer); Burchell, 7883! Group of *A. cyanea*, Gawl.

Sisyrinchium trinerve, *Baker*. — Perenne, fibris radicalibus gracilibus dense cæspitosis, collo radicis fibris setosis densis coronata.

Folia dura, persistentia, glabra, stricta, erecta, pedalia, angustissime linearia, trinervia. Scapus subteres, strictus, gracilis, erectis nudus, pedalis vel sesquipedalis. Spatha solitaria terminalis 3-4-flora, valvis duris linearibus, exteriori 2-3 poll. longo. Pedicelli 12-15 lin. longi. Perianthium flavum, 4 lin. longum. Capsula oblonga, 4 lin. longa. *Andes Boliviæ;* Mandon, 1218! 1220 bis! *Huanaco, alt.* 10,000 *pedes;* Pearce, 87! There is no species already described with yellow flowers and terete stems.

S. Glaziovii, *Baker.*—Perenne, dense cæspitosum, glabrum, fibris radicalibus gracilibus brevibus. Folia firma, linearia, crebre striata, $1\frac{1}{2}$-2 lin. lata, inferiora 3-4 poll. longa. Caules pedales, late ancipite, superne parce ramosi, foliis pluribus reductis 1-2 poll. longis præditi. Spathæ 3-4, terminales, pedunculatæ, 3-4-floræ, valvis duris lanceolatis subæqualibus 8-9 lin. longis. Perianthium luteum, 6 lin. longum, segmentis obovato-oblongis obtusis 2 lin. latis. Filamenta $1\frac{1}{2}$ lin. longa, in columnam cylindricam prorsus connata. Capsula globosa, 2 lin. longa. *Rio Janeiro;* Glaziou, 6732! Intermediate between *S. iridifolium* and *alatum.* It may be the plant figured in "Flora Fluminensis," vol. vii., tab. 2, under the name of *Souza Canes*, which is *Sisyrinchium Canes* of the 2nd edition of Steudel's "Nomenclator."

S. Weirii, *Baker.*—Perenne, glabrum, erectum, 3-4 pollicare, dichotomiter ramosum. Caules flexuosi, distincte alati, ad nodos 1 lin. lati. Folia plura, alterna, omnia segregata, lanceolata, acuta, rigidula amplexicaulia, 9-12 lin. longa, basi 1-$1\frac{1}{2}$ lin. lata, costa ad marginem exteriorem contigua. Spathæ terminales, pedunculatæ, bifloræ, valvis duobus lanceolatis firmis viridibus foliis omnino consimilibus, pedicellis cernuis longe exsertis. Perianthium non vidi. Capsula globosa 2 lin. crassa. *Brasilia meridionalis;* Weir, 372! Intermediate between *S. alatum* and *vaginatum.*

S. monostachyum, *Baker.*—Perenne, dense cæspitosum, fibris radicalibus gracilibus brevibus, collo radicis dense setosum. Folia omnia radicalia, anguste linearia, 3-4 poll. longa, $\frac{3}{4}$-1 lin. lata, stricta, erecta, 9-11-nervata. Caulis semipedalis vel pedalis, distincte anceps nudus, simplex, spatha unica terminali et 1-2 lateralibus, sessilibus segregatis præditus. Spathæ 1-2-floræ, valvæ duræ, lanceolatæ, 6-9 lin. longæ, subæquales vel exterior longior cuspidata. Pedicelli spatha breviores. Ovarium glabrum, turbinatum, 1 lin. longum. Limbus luteus, 4 lin. longus, segmentis oblongis. Filamenta 1 lin. longa, basi solum connata. *Uraguay in collibus Saxosis prope Monte-Video;* Gibert, 745! Resembles *S. iridifolium* in flower and general habit. Remarkable for its naked distinctly ancipitous stem, with 2-3 clusters of flowers, the side ones sessile, as in the Chilian *S. cuspidatum*, Pöppig.

S. gracile, *Klotzsch MSS.*—Perenne, fibris radicalibus brevibus gracillimis, collo radicis setis densis stipato. Folia radicaulia plura, stricta, erecta, pedala, subteretia. Caulis gracilis, strictis, obscure anceps, dimidio inferiore nudo, superne paniculato. Spathæ terminales pedunculatæ 1-2-floræ, valvis lanceolatis firmis acutis subæqualibus 6-9 lin. longis. Pedicelli erecti, exserti, gracillimi, 12-15 lin. longi. Perianthium flavum, 3 lin. longum. Ovarium minutum turbinatum glabrum. *Brasilia meridionalis;* Sello, 3863! This is allied to *S. micranthum* and *iridifolium.* It is referred by Dr. Klatt to *S. tenuifolium*, H. B. K., but the root-fibres are quite different, the habit tall and slender, and the flowers much smaller, with a naked ovary.

S. PACHYRHIZUM, *Baker*.—Perenne, fibris radicalibus cylindricis carnosis dense cæspitosis. Folia radicalia plura, linearia, graminoidea, 6-9 poll. longa, 1½-2 lin. lata, crebre nervata. Caulis distincte anceps, 1-2-pedalis, modice robustus, tertio superiori copiose paniculato, infra paniculam nudus. Spathæ multifloræ, omnes terminales pedunculatæ, valvis lanceolatis acutis 5-6 lin. longis. Pedicelli gracillimi exserti. Perianthium luteum, 3 lin. longum. Capsula globosa, glabra, 2 lin. crassa. *Brasilia meridionalis;* Sello, 3862! *Uraguay ad ripas omnis dicti El Santa Lucia;* Gibert, 933! Near *S. tenuifolium*. It is the *S. Sellowii* of Klotzsch in Herb. Reg. Berol., but not *S. Sellowianum*, Klatt in Linnæa, xxxi., 375.

S. MANDONI, *Baker*. — Perenne fibris radicalibus cylindricis carnosis, collo radicis setis fibrosis densis coronato. Folia radicalia anguste linearia, glabra, pedalia, distincte nervata, 1½-2 lin. lata. Caulis pedalis et ultra, anceps, parce ramosus, foliis paucis reductis præditus. Spathæ terminales, pedunculatæ, 3-4-floræ, valvis exterioribus lanceolatis, subæqualibus, 9-12 lin. longis. Pedicelli 9-12 lin. longi. Ovarium oblongum, glabrum. Perianthii limbus luteus, 6-7 lin. longus. Stamina perianthio duplo breviora, filamentis basi solum connatis, antheris magnis. Capsula oblonga, 5-6 lin. longa. *Andes Boliviæ, regio temperata;* Mandon, 1217! *Nova Granata;* Purdie! Jurgensen, 387! Habit of *S. iridifolium*, with the fleshy root-fibres of the group of *S. graminifolium*.

S. JAMESONI, *Baker*.—Perenne, dense cæspitosum, fibris radicalibus gracilibus. Folia radicalia plura, dura, anguste linearia, 4-6 poll. longa, 1 lin. lata. Scapus nudus, semipedalis, anguste anceps. Spatha unica terminalis 3-4, valvis exterioribus lanceolatis viridibus inæqualibus, exteriori longiori cuspidata 15-18 lin. longa. Pedicelli 9-12 lin. longi. Ovarium oblongum, glabrum. Perianthii limbus luteus, 5-6 lin. longus. Filamenta 1½ lin. longa, basi solum connata. Capsula oblonga, 3-4 lin. longa. *Ecuador;* Jameson, 246! *Andes Boliviæ, regio alpina;* Mandon, 1214! Near *S tinctorium*, H. B. K.

S. LATERALE, *Baker*.—Perenne, fibris radicalibus gracilibus. Folia radicalia plura, dura, subulata, persistentia, 6-9 poll. longa, ½ lin. lata. Scapus teres, gracilis, pedalis, supra florum capitum solum longe productus. Spathæ 1 vel 2 congestæ, 3-4-floræ, laterales, sessiles, valvis lanceolatis 6-9 lin. longis conspicue striatis, exterioribus firmis, interioribus scariosis. Pedicelli dense glandulosi, 9-12 lin. longi. Ovarium parvum, turbinatum, glandulosum. Perianthii limbus 4½-5 lin. longus, luteus? Capsula globosa, trigibba, 2 lin. crassa. *Andes Boliviæ prope Soratam, regio temperata;* Mandon, 1220! Only near the Brasilian *S. Luzula*, Klatt, from which it differs by its produced leaves, &c.

SHORT NOTES.

Vicia lutea, *Linn.*, in Essex.—I enclose a specimen of *Vicia lutea* from North Essex (v.c. 19), collected by my brother, Capt. J. A. Julian Briggs, 18th Regt., on 22nd June last, from a "bank on the sea-shore, by 2 Martello Tower, between Brightlingsea and St. Osyth, near the mouth of the Colne River." He has informed me that it occurred there in abundance, growing with *Lathyrus Nissolia* and *Vicia Cracca*. It seems to be new to the county, as it is not named in Gibson's "Flora," and does not appear for either v.cs. 18 or 19 in Watson's "Topographical Botany." The nearest v.cs. given for it in the latter work are Sussex West (13) and Suffolk East (25).—T. R. Archer Briggs.

Rosa Britannica.—A month or so ago I forwarded three or four species of Rose to Mr. Baker for identification, one had often puzzled me, and I am much gratified at Mr. Baker's reply. He says: "This is just the variety of *tomentosa* I once called *Jundzilliana*, and which Déséglise described as *R. Britannica*. It was found by Webb in Cheshire, and is very near *R. sylvestris* of Lindley." On opening Syme's "English Botany," I find there is no plate of this Rose. Syme says, "Only one bush actually known. From this some doubts may be entertained of its being native." I know two bushes here at Bray, Co. Wicklow, at a distance of a mile from each other, both in situations unsuspicious; and now that I am on the look-out for it, I have little doubt others will shortly be discovered. My knowledge of Roses is slender in the extreme; but this Rose I always looked upon as a species, it appeared so different from any others I had met with in this neighbourhood. Indeed, it was first brought under my notice by a lady who is no botanist asking me what curious Rose that was "with the sticky leaves, strong resinous odour when rubbed, and hairy fruit."—R. M. Barrington.

Callitriche obtusangula, *Le Gal*, in Herts.—I enclose specimens of this distinct-looking water-weed from Hoddesdon Marsh, near Broxbourne, Herts, where I noticed it in some abundance in ditches by the roadside, growing in company with *Ranunculus pseudofluitans*, &c., but, as far as I am aware, with no other species of its own genus. It will probably be found to extend into the neighbouring county of Essex, and, as suggested by Prof. Babington (Journ. of Bot., n.s., vol. i., p. 78), may turn out not to be so rare as has been supposed.—R. A. Pryor.

Extracts and Abstracts.

REPORT FOR THE YEAR 1875 OF THE HERBARIUM OF THE ROYAL GARDENS AT KEW.

By J. D. Hooker, C.B., M.D., F.R.S.

In my report for last year I stated that the desirability of providing more commodious and fire-proof accommodation for the Herbarium, Library, MSS., and collections of drawings of plants, was under the consideration of the Government. A sum of money was included in the Estimates for the purpose of erecting a new building. Up to the close of last year, however, the plans had not been finally decided upon, owing in great part to the difficulty of determining to what extent the existing building could be rendered available. I should view with satisfaction the incorporation of, at any rate, the front portion of this in the new design. When first purchased by George III. it was determined, at the instance of Sir Joseph Banks, to devote it to the accommodation of a botanical library and herbarium, for which the garden collections would have afforded a foundation. One of the rooms was at the time fitted up with bookshelves as a commencement towards carrying out this project, and these are still in use. At Sir J. Banks's death the plan was abandoned, and the house was eventually occupied by the late King of Hanover, after whose death it was again devoted to the purpose for which it was originally destined.

The Herbarium has now been housed in it for nearly a quarter of a century, and has at last completely outgrown its space. In this house the various important botanical works which have proceeded from Kew, and which will always be identified with the Herbarium, have been prepared. I am not without hopes that in my next report I may be able to record, if not the completion, at any rate the considerable progress, of the new edifice.

In the Fourth Report of the Commission on Scientific Instruction and the Advancement of Science, it is recommended (paragraphs 57 and 154), "That opportunities for the pursuit of investigations in Physiological Botany should be afforded in the Royal Gardens at Kew." To this recommendation effect will be given by the erection of a laboratory, through the liberality (as I announced in my last report) of T. J. Phillips Jodrell, Esq., M.A. It was originally intended that this laboratory should form part of the group of buildings containing the Herbarium. But, in consideration of the necessity of using gas in it and the consequent risk of fire, it has been determined to place it in a reserved portion of the garden, not far from No. 2 Museum and near the Herbaceous collection and the propagating-houses.

The sum placed by Mr. Jodrell at our disposal amounts to £1500. Of this it has not been considered expedient to expend more than half on the actual building, leaving the remainder to meet the cost of fittings and apparatus. The design was very carefully considered, and, as finally approved by your Lordship, provides for a building of one story in height, with rooms of moderate but commodious size for chemical, physiological, and microscopic work. The construction has been commenced, and will, I hope, be concluded during the present year.

Very extensive collections and contributions have been received at the Herbarium (chiefly by gift) during the past year.

The complete herbarium of the late J. Stuart Mill was presented after his death by Miss Helen Taylor. Although better known for his philosophical and other writings, Mr. Mill was throughout his life an eager botanist. Mr. Mill collected diligently in his early life in the neighbourhood of London, and in his later years travelled extensively in South Europe. The range of his specimens extends from the Pyrenees to the Bithynian Olympus, and Greece is particularly well represented, partly by plants gathered by his own hands and partly by a collection procured from Professor Van Heldreich, of Athens. Amongst plants from Asia Minor is a new and very distinct species of flat-leaved *Sedum*, which has been described by Mr. Baker in the "Journal of Botany" under the name of *Sedum Millii*. A selection of about 2530 species has been made from the collection for the Kew Herbarium, and it is Miss Taylor's wish that the remainder be presented to Harvard University, U.S.A., and to the Botanical Museum of the Melbourne Gardens.

The herbarium of the Rev. R. T. Lowe (containing 1653 species), in accordance with his will, has been divided between the Herbarium of the Royal Gardens and that of the British Museum, the few unique specimens under instructions from the executor being retained at Kew. It consists almost exclusively of plants of the Atlantic Islands, and is especially valuable as including the carefully determined types of the unhappily unfinished "Flora of Madeira and adjacent Islands," and of other publications.

The herbarium of the late J. T. Moggridge (author of the "Flora of Mentone") has been presented by his father, Mr. M. Moggridge.

Further collections have been received from the Expedition of H.M.S. *Challenger*, comprising those from the Islands of the Eastern Archipelago, Philippines, &c. The new Ferns, about twelve in number, have been described by Mr. Baker for the "Journal of the Linnean Society."

The collections formed during the Transit of Venus Expeditions, in Kerguelen's Land by the Rev. A. E. Eaton and in Rodriguez by Dr. I. Balfour, have been presented by the Royal Society, and are in course of arrangement.

The most important remaining contributions are especially noticed below under the different geographical headings. The figures in brackets denote the number of species received from each contributor.

EUROPE.—Cooke, M. C.; European and American Fungi (39); "Fungi Britannici" (purchased, 300). Geheeb, A.; Mosses (103). Goeze, Dr.; Portuguese Plants (36). Lindberg, Dr.; Irish Hepaticæ (34). Lojka, H.; European Lichens (purchased, 56). Maw, G.; plants from Spain and Portugal (29). Pançic, Dr. Belgrade; (58). Plowright, C. B.; *Sphæriacei* (purchased, 100). Rabenhorst, Dr.; European *Hepaticæ* and *Algæ* (purchased, 60). Smith, W. G.; drawings. Stewart, S. A.; Ireland (10). Thuemen, Baron; Mycotheca universalis (purchased, 300). Other contributions were received from Briggs, T. G.; Edgeworth, M.P.; Fraser, Dr.; Gomes, Dr.; Guise, Sir W. V.; Hanbury, the late D.; Howard, E.; Mansel-Pleydell, J. C.; Masters, Dr.; Max Leichtlin; Oakshott, Mrs.; Parlatore, Prof.; Reichenbach, Prof.; Whitehead, J.; Sadler, J.

ASIA.—*India and Indian Archipelago.*—Aitchison, Dr.; N. W. India (37). Bellew, H. W.; Kashgar and Kashmir (208). Henderson, Capt.; Indian Ferns (21). Riedel, M. (per Dr. A. B. Meyer of Dresden); Gorontalo, Celebes; collection of Celebes plants; two new species have been described for the "Journal of the Linnean Society"

(341). Scheffer, Dr., Botanic Gardens, Buitenzorg; plants from Java, Borneo, &c., including numerous *Dipterocarpeæ* (426). Treutler, Dr.; an excellent collection from the neighbourhood of Darjiling, with specimens for distribution (1276). Wall, G.; Ceylon Ferns (20). Other contributions have been received from Beddome, Col.; Cattell, Dr.; Hobson, Lt.-Col.; King, Dr.—— *China and Japan.*—Shearer, Dr. (per J. Harbord Lewis); Kewkiang, China; collection including one new genus and a considerable number of Chinese specimens which Kew did not possess: the principal novelties have been described by Mr. S. Le M. Moore in the "Journal of Botany" for August. Among other interesting species there is a Tulip-tree (*Liriodendron*), which, if it proves indigenous, as Dr. Shearer believes it to be, in Kewkiang, is new to the flora of the Old World (602). Other contributions have been received from Ford, C.; Foreign Office; Maximowicz, Dr.; Quekett, J. F.

AFRICA.—*North and Tropical.*—Afrikanische Gesellschaft, Berlin; Soyaux's Loango plants (purchased, 165). Bulger, Lt.; Koomassie (3). Cameron, Lt.; neighbourhood of Lake Tanganyika: the majority of the plants unfortunately are in very bad condition; the novelties have been described for publication in the "Journal of the Linnean Society" (100). Cosson, E.; Morocco (341). Hildebrandt, Somali and Zanzibar (purchased, 440). Mair, Mrs.; Sierra Leone; chiefly Ferns (22). Monteiro, J.; Angola (1). Mueller, Dr. K.; Mosses of Schweinfurth's African Expedition (33). Oakshott, Mrs.; plants collected by Rev. C. New about Kilima-njaro (8). Thomson, G.; Mosses from Camaroons (30).——*South.*—Atherstone, Dr.; Diamond Fields, &c. (208, containing many new species). Barber, Mrs.; Kimberley Gold Fields (31). Barkly, H. E. Sir H.; drawings of Stapelias. Buchanan, Rev. J.; Natal Monocotyledons (264). Eaton, Rev. A. E.; Cape of Good Hope Lichens. Sanderson, J.; Natal (9). Shaw, Dr. J.; Cape (8).——*Mascarene Islands and Seychelles.*—Balfour, Dr. I. B.; Bourbon plants. De Cordemoy, Dr. J.; Bourbon (65). Horne, J.; Mauritius and Seychelles (340).

AMERICA.—*North.*—Dawson, G. M.; plants collected on N. American Boundary Expedition (110). De Candolle, Prof.; calques des dessins de la Flore de Mexique, de Moçino et Sessé (purchased). Endres, M. (presented by Messrs. Veitch); Costa Rica (218). Gray, Prof. A.; very valuable collections, including types of many new species from the Western States (316). Horner, A. C. (voyage of *Pandora*); Greenland plants (95). Mitchell, Mrs.; Honduras Ferns (3). Munroe, H. F.; Illinois (388). Watt, D. A.; Ravenel's Carolina Fungi (500). Wilson, the late W.; annotated copy of Drummond's N. American Mosses (purchased). Other contributions have been received from Cross, R.; Engelmann, Dr.; Murray. A.; Pringle, C. G. —— *West Indies.*—Lefroy, H. E. Genl.; Bermuda (13). Jenman, G. S.; Jamaica Ferns (45).——*S. America.*—Gibert, E.; Montevideo, &c. (382). Glaziou, A.; further Brazilian collections, which are of especial value as the numbers are cited in "Flora of Brazil" (507). Hiern, W. P.; selected desiderata from Warming's Brazilian Monopetalæ (24). Traill, J. W. H.; further collections from the Amazons: these are especially rich in Palms (of which a fine set has been selected for the Kew Herbarium to be mounted upon paper of large size) and in insect-tenanted plants; the Dicotyledons are in course of arrangement. Other contributions have been received from Boreau, Prof.; Bull, W.; Grisebach, Prof.; Holmes, E. M.; Leybold, Dr. F.; Veitch, Messrs.; Winter, A.

AUSTRALASIA AND POLYNESIA.—Bernays, L. A.; Queensland Acclimatisation Society (4). Cheeseman, T. F.; New Zealand (2). Hector, Dr.; New Zealand (90). Kirk, T.; New Zealand (12). Mueller, Baron von; Australian plants; plants of Lord Howe's Island; Educational Collection, Part II. (86). Powell, Rev. T.; Samoan plants (253). Schomburgk, Dr. R.; plants from vicinity of Lake Eyre (271). Whitmee, Rev. S. J.; Samoan plants; the Ferns have been described by Mr. Baker in the "Journal of Botany" (178).

REPORT OF THE CURATOR OF THE BOTANICAL EXCHANGE CLUB FOR THE YEAR 1875.

[WE have extracted the more important portions only of this Report, omitting much matter which has been already published in the pages of this Journal.—*Ed. Journ. Bot.*]

Thalictrum minus, Linn., var. "Cheddar Cliffs, Somerset, September, 1875."—J. G. BAKER. I think it is *T. minus*, var. *montanum*, but hesitate between that name and *flexuosum;* some of the fruits in the separate paper resembling the one, and some the other. I should have been inclined to think that the long and comparatively slender fruits, like those of *T. flexuosum*, had not been matured when the plant was gathered, had it not been that I have an undoubted specimen of *T. flexuosum* from Cheddar Cliffs, collected by Mr. T. B. Flower. It is, however, quite possible that both these forms of *T. minus* grow at Cheddar. I have sown some of the seeds from Mr. Baker's plant, which, if they germinate, will enable me to decide the matter.—J. T. BOSWELL.

Thalictrum majus, Sm., *flexuosum*, Bab. Man. "Shore of Loch Tay, Mid Perth, July 14, 1874."—AUGUSTIN LEY. This is what I consider typical *T. flexuosum*. I have had in cultivation from this station for some years a root sent by Mr. Frederic Stratton. It runs at the root, and the fruit is about twice the length of that of *T. maritimum* and *montanum*. The young leaves of the Loch Tay plant break through the ground about a fortnight later than those of *T. maritimum* from Kirkcaldy and *T. montanum* from Derbyshire, and about the same time with those of *T.* '*saxatile*' from Cambridgeshire.—J. T. BOSWELL.

Thalictrum flavum, Linn., "*a. sphærocarpum*." "River Leam at Offchurch, Warwickshire, June and August, 1873."—H. BROMWICH. All the fruits on the specimens sent are diseased, probably from a gall, so that it is impossible to say to which form of *T. flavum* this belongs. All the British *Thalictra* are liable to this deformity, but *T. flexuosum* seems the one most frequently attacked by the disease.—J. T. BOSWELL.

Cochlearia anglica, Linn. "A further series from the neighbourhood of Plymouth, which seem to support the view that *C. anglica* is connected by intermediates with *C. officinalis*, hinted at in the last Club Report. The matter is hard to investigate owing to the plant losing the earlier and characteristic root-leaves before the pods attain their full size. Thus it becomes difficult to note what correlation exists between the shape of the root-leaves and that of the pods. I believe *C. anglica* to be perennial, and to be propagated to some extent by the younger leaf-bearing portions of the branched root-stock breaking away from the older, and in this way forming separate plants in the soft mud. I suspect the leaves of such offset plants to differ considerably from those of plants immediately derived from seed."—T. R. A. B. There can be no question that Mr. Briggs's specimens connect *C. anglica* with *C. officinalis*, so much so that in several instances, looking at the dried plant, I feel at a loss which name ought to be applied. The best time for examining the root-leaves is in late autumn, say September or October. There is, I suppose, no doubt that both typical *anglica* and typical *officinalis* occur in the neighbourhood of Plymouth. Can it be that these two hybridise? By the estuary of the Thames *C. anglica* is common, chiefly, if not entirely, the form named var. *gemina*, in which the root-leaves are gradually narrowed into the petioles, and the pod large, oval-obovate, and much constricted on the outer side over the replum. *C. officinalis* I have never seen in the Thames estuary. In the "Flora of Essex" it is reported from the sea-shore at Wakering, which is entirely beyond the Thames estuary; and Mr. H. C. Watson has seen a specimen from West Kent, collected by "Taylor," which must be from the Thames estuary; and Mr. Watson also records it from West Kent on the authority of Smith's Catalogue, but this may be quite out of the Thames estuary. We find, therefore, *C. officinalis* very scarce in a district where *C. anglica* is abundant; and here, out of thousands of specimens of *C. anglica*, I have never seen any which approached *C. officinalis* as Mr. Briggs's specimens do. Again, in the East of Scotland, *C. officinalis* is abundant. Two forms of this occur, one with large, mostly subglobular pods, the other with smaller pods which are often ovoid. This last form appears to me the same as the form that occurs in alpine districts, and is entered in the "London Catalogue" as var. *alpina*. To this small-fruited form of *C. officinalis* belong, I suspect, all the plants recorded as *C. danica* from Scotland, and some which I have received from England under that name. Genuine *C. danica* has the petals about half the size of those of *C. officinalis*, only slightly exceeding the sepals and oblong-oblanceolate in form, while in *C. officinalis* they are considerably longer than the sepals, and spathulate-obovate. In the east coast of Scotland *C. anglica* is not known to occur. It is entered in "Topographical Botany" in the counties of Edinburgh and Elgin, but with a query after each county name. We have thus in the east coast of Scotland a district in which *C. officinalis* is abundant and *C. anglica* very rare, if present at all; and out of thousands of specimens of *C. officinalis* I have never seen one showing the least approach towards *C. anglica*. All we can say at present is—first, that in a district where *C. anglica* occurs unaccompanied by *C. officinalis*, the former shows no tendency to approach the latter; secondly, that in a district where *C. officinalis* occurs unaccompanied by *C. anglica*, *C. officinalis* does not approach the latter; thirdly, in a district where both occur, intermediate forms appear connecting the one with the other. —J. T. BOSWELL.

Viola lactea? "Heathy wayside north of Fleet Pond, Hants, June 4, 1875."—H. C. WATSON and J. L. WARREN. In a letter to Mr. Warren, Mr. Watson says: "I am at fault how to label this. It ill agrees with any of the three figured in 'English Botany'—perhaps least like the scrap of *lactea* with its very small spur. It rather better comes between the figures given for *flavicornis* and *stagnina*. I wish now that we had looked for more of it in flower." In another letter to Dr. Boswell, dated November 3, 1875, Mr. Watson thus writes: "Please to look at these Violets, and tell me what you make of them. Mr. Warren and I were returning to Fleet Station from the circuit of the pond, he looking along one side of the road, I intent on the other side. He picked the *Viola*, and said 'What is this?' I saw at a glance that it was the same with specimens sent me two or three years ago by Mr. Briggs, and which have remained undecided upon, but are mentioned in 'Topographical Botany' (part ii., pp. 598-9). By longer delay we ran the risk of missing the only train at Fleet Station, so each took a very few flowering specimens, got hastily among the dense furze, &c. I fully intended to return for a better examination and supply, but circumstances kept coming to prevent until too late. It so chanced at length that I went on the hottest day of the year, and found the seeding plants very difficult to work out among an entanglement of furze, &c., while a bright sun was baking my stooping head, and the thermometer at 86° in shade. . . . The plants branch like *V. canina* and *V. lactea;* but you will see some indications of a creeping root or stole."—Is not the North Hants plant *V. stricta*, Hornemann? It agrees with it in the tall stem, long petioles, ovate-lanceolate leaves, abruptly contracted or subcordate at the base, which is decurrent into a wing on the upper part of the petiole; large inciso-serrate stipules, of which the uppermost often equal the petioles; long peduncles; large flowers with greatly developed spurs; obtuse capsule, abruptly acuminated into the apiculus, and without prominent lines. It differs, however, in the stem being weak and flexuous, but that may be owing to its growing amongst a tangle of gorse, &c. The petals of the Fleet Pond plant also seem narrower than those of *V. stricta;* but the flowers having withered before they were pressed, it is not easy to be sure on this point.—J. T. BOSWELL. I have never seen any of these heath Violets with so short a spur as that given to *lactea* in "E. B.," though I have very often found their flowers damaged through having had the point of the spur eaten away by some insect. The figure in "E. B." looks exactly as if it had been taken from a plant so injured.—T. R. A. B.

Cerastium "*triviale*, Link. var. *c. pentandrum*." "Nairn, July 12, 1874."—AUGUSTIN LEY. Not *pentandrum*, nor does it belong to *triviale* at all. The specimens are fragmentary ones of a single immense plant, as the Rev. A. Ley has informed me in a letter. Prof. Babington has favoured me with the following opinion on a specimen that I sent him: "I think that this is fine *C. tetrandrum*. I have seen it quite as large, and the number of stamens is not of much consequence." Since I wrote the above Dr. Boswell has forwarded the following note with reference to this plant: "Certainly *C. tetrandrum*. Mr. J. F. Duthie collected the true *triviale*, var. *pentandrum*, near Marlborough in 1875." I have found what seems the same form of *tetrandrum* as this plant of Mr. Ley's growing on a wall on the coast above Bigbury Bay, S. Devon. Its flowers also had five stamens.—T. R. A. B.

Cerastium pumilum, Curt. "Wigwold Common, Gloucestershire, May, 1875."—J. F. Duthie. A good supply of a plant asked for by many members of the Club. The capsule in these specimens from Mr. Duthie is considerably longer than in some which I have had recently fresh from Torquay through the kindness of Mr. F. Townsend.—T. R. A. B.

Cerastium triviale, Link. var. *b. holosteoides*. "Bank of Tay, near Perth, Co. Perth, July 29, 1875. The specimens sent were gathered in the noted Perth habitat, pretty late in the season. Whether that be the reason or not I do not know, but I cannot find among my specimens any the sepals of which can be said to be glabrous, although they were collected at all parts of the bank below high-water mark ; while all the other characters of this variety, including the large flowers, are well enough represented."—Tom Drummond. (See Rep. B. E. C., 1872-74, pp. 11, 12.)

Stellaria uliginosa, Murr. "Specimen showing the perennial character of the plant. (See Journ. Bot., vol. ii., n.s., p. 175.) By a stream, Tamerton Foliott, S. Devon, March 31, 1875."—T. R. Archer Briggs. It is long since I have been aware that this plant was a perennial. In 1864 I sent to the Thirsk Bot. Ex. Club examples of the autumnal state of *S. uliginosa*, showing the barren shoots developed in autumn, which have the leaves stalked, not sessile as in the flowering-stems. These specimens are noticed by the Curator of the B. E. Club in the Report for 1864. I think my specimens were gathered in 1863, too late to be noticed in the description of the plant in "English Botany," ed 3. The same feature occurs in *Veronica Chamædrys*, which has the autumnal barren shoots furnished with stalked leaves, though the spring and summer flowering shoots have sessile or subsessile leaves. This fact also I was not aware of when I was writing the description of the plant for "English Botany," ed. 3. —J. T. Boswell.

Spergularia marginata, Syme, E. B., var. having the calyces and pedicels decidedly glandular hairy. "From a rocky and stony spot by Weston Mill Lake, a tidal inlet from the Tamar, S. Devon, June, 1875 ; also from the shore of Hooe Lake, a tidal inlet from the Plym estuary, July, 1875." Notwithstanding the short glandular hairs on the upper portions of these specimens, they are clearly the *marginata* of "Eng. Bot.," by the seeds. Mr. Chas. Bailey sends a large number of specimens from the "edges of a tidal drain on the eastern side of the Llandudno Railway, near Castell Diganwy, N. Carnarvonshire," some of which have the youngest pedicels and calyces more or less hairy, the hairs mostly disappearing as the parts mature, and never forming a noticeable feature, as in the Plymouth examples.—T. R. A. B.

Spergularia rupestris, Lon. Cat., var. *b. glabrescens*, Lebel. "Cliff by Bigbury Bay, below Kingston, S. Devon, July, 1875." Clearly *rupestris* (*rupicola*, Bab. Man.) by habit and seeds, but with the glandular hairs so reduced as to make the plant seem quite glabrous at first sight, yet careful examination shows short glandular hairs on the inflorescence. It is, I have little doubt, the *glabrescens* of Lebel, thus referred to by Brébisson in his "Flore de la Normandie" (p. 57, ed. 4): "Cette forme à peu près glabre, excepté sur l'inflorescence, est signalée à Gatteville (Manche) comme très-rare par M. le Dr. Lebel." —T. R. A. B.

Malva borealis, Wallr. "Roadside near Antony Village, E. Cornwall, Aug., 1875." From the spot where it also grew in 1874. Noticed springing up again there in April, 1876.—T. R. A. B.

Trigonella ornithopodioides, DC. "Malvern Link, Worcestershire, May, 1875. This plant has not been previously reported from Worcestershire. I found it growing in several places among the grass on Malvern Link. It was first pointed out to me by Mr. W. J. Smith, of Worcester, a young man of great promise, who has been cut off since I gathered it by aneurism of the heart."—J. FRASER, M.D.

Trifolium Bocconi, Savi. "Near Lizard Point, W. Cornwall. I have found this very rare plant in considerable quantity in two new stations near the Lizard. I have met with it in five places, and doubtless may find it in others. June, 1875."—J. CUNNACK. The largest of these specimens from Mr. Cunnack have stems 3½-4 inches long.

Trifolium strictum, Linn. "I have found this in another locality, June, 1875."—J. CUNNACK. Mr. Beeby has also sent specimens of this and of *Bocconi*, gathered at Caerthillian in June, 1872.

Vicia Orobus, DC. "Specimens taken from a large bushy plant that I found on a steep basaltic cliff at Sallagh Braes, near Larne, co. Antrim, July 20, 1873. The rocks are now about two miles inland, but at a recent geological period were maritime. This species has not heretofore been recorded for the North of Ireland with certainty, but its discovery in Antrim renders it probable that Sherard's plant found at Rostrevor, in co. Down, was really *V. Orobus*, and not *V. sylvatica*, as conjectured by the authors of "Cybele Hibernica."—S. A. STEWART.

Agrimonia odorata, Mill. "Trinley Wood, near Canterbury, E. Kent, September, 1875."—F. J. HANBURY. New to v. county 15.

Rubus Leesii, Bab. "Bog at Woodloes, near Warwick, June and September, 1875. Only one small patch in a little bog. I first noticed it the year before last in autumn, and gathered some of the barren stems. I visited it last summer for the flowers, which all seemed to be abortive, but it was so devoured by snails that I had a difficulty in finding any. There is abundance of *Rubus Idæus* in the bog, including the variety with yellowish fruit; *Juncus obtusiflorus*, *Galium uliginosum*, &c. I sent the *Rubus Leesii* to the Rev. A. Bloxam, who considered I had named it correctly."—H. BROMWICH. I am able to add the following note on this from Professor Babington: "*Rubus Leesii*, a very curious form worth careful study."—T. R. A. B.

Rubus saxatilis, Linn. "Lethonsden, Fife, August, 1875."—T. DRUMMOND. Nicely in fruit. Not recorded for v. c. 85 in Top. Bot.—T. R. A. B.

Rosa tomentosa, Sm., var. *b. subglobosa.* "I know of two localities for this, one by roadside near Woolmer Green, on gravel, and another on chalk dug out of the tunnels near Welwyn, Herts."—T. B. BLOW. "St. Stephens, E. Cornwall, July and September, 1875." Remarkable for the soft texture of its densely hairy leaflets, which have few or no glands on either surface. The Cornish plant has shorter peduncles than the Welwyn one, in this respect answering the better to Smith's description in his "English Flora."—T. R. A. B.

Rosa micrantha, Sm., var. *pedunculo nudo.* "Hedge between Efford and Egg Buckland village, S. Devon, 1875." This naked-peduncled variety of *micrantha* is put with *R. tomentella*, Leman, by M. Déséglise, an arrangement which I cannot adopt. It differs from the type only in having naked peduncles and sepals with few or no glands on the back. The var. *Briggsii*, Baker, is simply a luxuriant form of this. The naked-peduncled plant has been recently recorded by Dr. Christ from "Vallée de Clanzo," near Santa Anna, on the Maritime Alps.—T. R. A. B.

Rosa stylosa, Desv., var. *a. systyla*, Bast. "Hedge near Adisham, Kent, September, 1875."—T. B. BLOW. "Near Saltram, S. Devon; Hay Lane, between Torpoint and Antony, &c., E. Cornwall." This is undoubtedly the *systyla* of the Continental botanists, as received from M. Déséglise; and specimens from the neighbourhood of Plymouth have been so named by him. Here it is quite a common Rose and widely distributed.—T. R. A. B.

? var. *leucochroa*, Desv. "Hedge, Cutmere, St. Germans, E. Cornwall, July, 1875. Between St. Johns and Whitsand Bay, E. Cornwall, September, 1875." This has a much stiffer habit than true *systyla*, shorter peduncles, a less prominent disc when in fruit, and styles commonly not so much agglutinated, or quite free. The petals are white, though of a creamy tint when expanding. M. Déséglise has had specimens from several places in Devon and Cornwall, and has pronounced them to be *leucochroa*. I used to regard this Rose as the *collina* of Jacquin, but am now satisfied that it is not that. It seems to be nearer to *systyla*, Bastard, than to any other of our Roses. It is abundant about Plymouth.—T. R. A. B.

Rosa arvensis, Huds., *b. bibracteata.* "Hedge between Latchbrook and Notter;" also "Sheviocke, E. Cornwall, 1875." This luxuriant variety of *arvensis* proves to be widely distributed about Plymouth, occurring both in Devon and Cornwall. Mr. Bagnall has sent a number of specimens from "Butler's Hill, near Tardebig, Warwickshire." The calyx-tube of this last is broader when in fruit than in the Plymouth examples, but the long-pointed and very sharply-cut leaves, together with the luxuriant habit of the plant, are quite characteristic of *bibracteata.*—T. R. A. B.

Callitriche Lachii, Warren MS. "Tabley Moat, Cheshire, September, 1868. It seems possible that this may prove an undescribed *Callitriche*. I regard it as intermediate between *hamulata* and *obtusangula*. It has nearly the fruit of the latter, with remarkably long persistent styles. But its upper leaves are nearly linear, and the general habit of the plant, except the topmost rosette, is nearer coarse *hamulata*. Dr. Boswell will remember I sent him portions of this specimen last year. This year in July (in company with Mr. Webb)

I observed the same plant on the Lach Eye Meadows, near Chester. Should, therefore, Dr. B. think the plant worth a provisional name, I should propose *Callitriche Lachii*."—J. L. WARREN. A very puzzling form, intermediate between *C. obtusangula* and *C. stagnalis*, having the lobes of the fruit rounded as in *obtusangula* and the styles long as in *C. stagnalis*. I can see no resemblance to *C. hamulata*, for the bracts are persistent and the fruit large and not broader than long. The lower leaves of *C. obtusangula*, growing in deep water, are often linear, notably so in specimens collected by Mr. Duthie near Deal. They are also linear in *C. stagnalis* when it grows in deep water. The latter plant commonly grows on mud, in which case the leaves are all spathulate or obovate, but the same plants, should the water rise and cover them to the depth of a foot or so, have the lower leaves linear. The converse of this takes place in *C. hamulata*, for when it grows on mud the leaves are all linear without a terminal rosette of obovate leaves. In this state the fruit is stalked, but when the water rises over it a terminal apical rosette of obovate leaves is developed, and only sessile or subsessile fruit is produced.—J. T. BOSWELL.

Valerianella eriocarpa, Desv. "Hedgebank by a cornfield, Rame, E. Cornwall, August, 1875." Some dozens of specimens grew last summer on a dry hedgebank, or old wall of stones and earth, bounding a cornfield at Rame, very near the coast and fully exposed to the breezes from the Channel. The spot is about five miles from Plymouth, as the crow flies, in a south-westerly direction. There were also a few examples in the field below, either among a crop of barley or in a weedy strip of ground between the corn and the hedgebank. On the latter the plant extended for two or three yards only, growing principally in one or two large patches.—T. R. A. B. It is the ordinary form.—J. T. BOSWELL.

Carduus tenuiflorus, Curt., var. *pycnocephalus*, Jacq. "In waste rocky spots on limestone under the Hoe, Plymouth, S. Devon; where ordinary *tenuiflorus* also occurs, July, 1875." M. Déséglise, to whom I sent a specimen, regards this as the true *pycnocephalus*, for which it was recorded by Mr. Keys. It looks considerably different from our ordinary *tenuiflorus*.—T. R. A. B. This looks much like true *pycnocephalus*, but has the spines of the leaves much stronger than in any of my Continental specimens of that plant. I should like much to see the lower leaves of the Plymouth "*pycnocephalus*."—J. T. BOSWELL.

Arctium nemorosum, Lej. "Field hedge, Welwyn, Herts, August, 1875. This occurs in several places around Welwyn, by field sides or in bushy places. It is a large (5 feet high) handsome plant, and is very strikingly different in habit to any other *Arctium*. The heads are large, almost or quite sessile, and much contracted at the mouth in fruit. I noticed it in E. Kent last autumn."—T. B. BLOW. Prof. Babington has favoured me with the following remarks on this plant: "I think that Mr. Blow's plant may be correctly named, but should like to have seen a root-leaf. These pieces may have been branches, and therefore of no value for inflorescence. Nevertheless, they are so like my specimens that I consider the name correct."—T. R. A. B.

Senecio vulgaris, Linn., var.; probably *hibernica*, Boswell, in Report B. E. C., 1872-74, p. 27. "Tregantle, E. Cornwall, April 17, 1875." A striking variety, of dwarf habit, having heads with a ray of conspicuous patent ligulate florets, at least one-third the length of the anthodes (in the fresh plant). A few dozen of small plants were growing in sand that had been blown from the shore up over a low cliff. Noticed again in the spring of 1876.—T. R. A. B. This seems precisely the plant mentioned in the Bot. Ex. Club Report cited above. The second generation from the Cork plant retains the ray, which is at first flat and then becomes revolute. Every seed seems to germinate. If *S. squalidus* be not in the neighbourhood of the East Cornwall plant, my supposition that it is a variety of *S. vulgaris* will be strengthened. Mr. Carroll, I believe, still thinks it a hybrid between *S. vulgaris* and *S. squalidus*.—J. T. Boswell. Tregantle is about five or six miles from Plymouth, in which neighbourhood *S. squalidus* is unknown.—T. R. A. B.

Bidens "*hybrida*." "Surrey side of Thames at Putney, October. 1875."—J. L. Warren. This form of *Bidens* I have formerly, received from Mr. Warren, gathered on the banks of the Willesden Canal, Middlesex. I at that time thought it might be a hybrid between *B. cernua* and *B. tripartita*, but I now believe it to be a luxuriant form of *B. tripartita*, into the ordinary state of which it seems to pass imperceptibly. It is distinguishable by the leaves being undivided—that is, not having lateral lobes which give them their tripartite form. The anthodes have a broader pericline and more numerous florets, and the fruit has frequently three or even four awns, although the lateral ones are always much longer than the inner and outer. The root is precisely similar to that of ordinary *B. tripartita*, having the root-fibres irregularly disposed, not produced from the lower nodes of the stem as in *B. cernua*, from which it differs also in the stalked leaves, with much broader laminæ, and the erect or suberect anthodes.—J. T. Boswell.

Hieracium dubium, Linn., Fries. "Root from Selkirk, July, 1873. There is certainly some mistake about this plant in the 'Students' Flora.' The description does not fit the Selkirk plant in several important points. The only other description that I have seen (excepting that in the Trans. Bot. Soc., Edinburgh) is that of *H. dubium* in Withering, which is not the same plant. I will try next season to get wild examples."—A. Brotherston. I think this is *H. pratense*, Tausch.—J. T. Boswell.

Hieracium strictum, Fries. "Aberdona, Clackmannan, August, 1875."—Tom Drummond. Mr. Drummond also sends a plant from Linmill in the same county, which he has labelled as a "broad-leaved form" of this, but both Dr. Boswell and Prof. Babington have doubts as to what this latter is. I have sent it out with a query against the name.—T. R. A. B. May be *H. elatum*, Fries, with the description of which it agrees pretty well, except that the leaves of our plant are not "*inciso-dentata*."—J. T. Boswell.

Erica tetralici-ciliaris, Syme. "Near Penryn, W. Cornwall, August, 1875. I have found this very fine and in great abundance about half a mile from the station, where I obtained the specimens sent in 1874. I noticed what I consider to be another hybrid form with corolla as large as in *Dabeocia polifolia*. I proposed taking a supply for distribution at a subsequent visit, as only a few plants were in flower when I first saw it, but could not manage to do so. I hope to carry out my intention in 1876."—J. Cunnack.

Pyrola media, Swartz. "Harlow Hill, Harrogate, June, 1875. New to M. W. Yorkshire (v. c. 64)."—T. J. Foggitt.

Solanum nigrum, Linn., *b. miniatum*. "Coast near Whitstable, Kent, September, 1875."—F. J. Hanbury. Two or three specimens.

Verbascum hybrid. "Stone-quarry near Warwick, September 1875. Seems to be between *Thapsus* and *virgatum*, growing with the former."—H. Bromwich. Evidently a hybrid, from the abortive capsules, and quite likely to be between the parents Mr. Bromwich suggests, as it grows with *Thapsus*. If sent without information, and judging from dried specimens only, I should have suggested *V. virgatum* and *V. Lychnitis* as possible parents, as the pubescence and shape of upper leaves approach those of *V. Lychnitis*.—J. T. Boswell.

Mentha sativa, Linn., var. *subglabra*, Baker. "By a ditch in the Tavy Valley, S. Devon, August, 1875." This Mint appears to be indigenous in this and a few other spots in the neighbourhood of Plymouth, but is, I should say, mostly a denizen. It quite comes between normal *M. sativa* and *M. rubra*. After arriving at this conclusion, I was pleased to find M. Déséglise remarking on a specimen of the Tavy Valley plant: "Je vois dans cet échantillon une Menthe du groupe de *M. rubra*, Sm., et non une *M. sativa*."—T. R. A. B.

Teucrium Botrys, Linn. "Boxhill, Surrey, August, 1875. This plant will probably ere long be much less plentiful in this locality, many acres of the ground in which it grows having been planted with young Firs, which in the course of a few years will no doubt smother the plant. Some of the specimens were collected among the young Firs, others on the open sloping side of the down towards the head of the valley. On the same day a friend and myself searched the Bookham station (which should be Bagdon Hill, not Bagley Hill, as in the 'Flora of Surrey'), but without success. I have also looked for it about Sanderstead, near Croydon, as Mr. Borrer many years ago, in the 'Phytologist,' mentioned having been shown plants by Mr. Anderson, of Chelsea, as coming from Sanderstead, but I have not succeeded in finding it."—A. Bennett. Also sent from a "chalk pasture, Boxhill," by Mr. Groves.

Utricularia vulgaris, Linn. "Moccas, Herefordshire, September, 1872."—Augustin Ley. Not given for the county (36) in Top. Bot.

Utricularia neglecta, Lehm. "Ditch near Penzance, Cornwall, August, 23, 1875."—Mrs. E. A. Lomax. In Eng. Bot., ed. iii., the leaves of *U. neglecta* are stated, on the authority of Reichenbach, to be not bristly even when young. In this Penzance plant, however, they are decidedly bristly, so there would seem to be some doubt as to the correctness of the name; but in the absence of flowers it is difficult to determine the species. Still a comparison with a Kentish specimen of undoubted *neglecta*, for which I am indebted to Mr. Hanbury, leads me to think this correctly named.—T. R. A. B. The small bladders and fine segments of the leaves lead me to endorse the name *neglecta* in spite of the bristles on the young leaves. I observe that some of the leaves are without bristles; probably the character is by no means constant, but I know too little of *neglecta* in a living state to be able to judge. It is to be hoped that flowering specimens from this station may be obtained, which would settle its name. Botanists who may visit Moray will, it is hoped, endeavour to procure flowering specimens of the *Utricularia*, believed by Mr. F. M. Webb to be *U. Bremii*, Heer, which was collected by Mr. Jas. B. Brechan, August 16, 1833, at Moss of Inshoch, Nairnshire, and seems to have occurred also in the Loch of Spynie. (See Journ. Bot., 1876, p. 146.) I have only a very poor specimen of the Loch of Spynie plant, quite insufficient to decide upon, but so far as the leaves and bladders are concerned it resembles *U. Bremii*, and most certainly is not *U. intermedia*.—J. T. BOSWELL.

Atriplex "*rosea*," Linn. "About three large plants on the West Sussex coast, between Coppard's Gap and Southwick, near cottage-rubbish, but probably brought in ship's ballast. September, 1875."—J. L. WARREN. (See Journ. Bot., vol. iv., n.s., p. 336.) This is not *A. rosea* of Koch, Grenier & Godron, Billot, exsic., no. 842, &c., but I believe *A. laciniata*, "Linn.," Koch., Fl. Germ. et Helv., ed. 2, p. 703, and Gren. & Godr. Fl. de Fr., vol. iii., p. 11; Billot, exsic. no. 1763 & 1763 (bis). Linnæus, according to Dr. Ascherson, confounded under the name *laciniata* the *A. arenaria*, Woods, and a plant, which in the first ed. of the "Species Plantarum," he described as *A. tatarica*: this, however, is not the *A. tatarica* of Schk. & Koch, which is *A. oblongifolia*, Waldst. & Kit. If Koch be right in citing *A. sinuata*, Hoff., as a synonym of his *A. laciniata*, it would be well to adopt this name for the plant to get quit of the confusion in the nomenclature. See Eng. Bot., ed. iii., vol. viii., p. 35; to which I must add that Nuttall having named an American Atriplex "*arenaria*" before Woods so named the European plant, the latter must be called by some other name. This Babington has done in the 7th edition of his "Manual," where the plant stands as *A. farinosa*, Dumortier. Mrs. Lomax sends this plant (*A. laciniata*, Koch, or "*sinuata*," Hoffm.) labelled "*Chenopodium glaucum*," collected on Marazion Green, Cornwall, August, 1875.—J. T. BOSWELL.

Rumex maximus, Schreb. "Lewes, East Sussex, September, 1875."—J. L. WARREN. And "sandy shore, Downderry, St. Germans, East Cornwall, August, 1875."—T. R. ARCHER BRIGGS. That these two plants belong to the same form there cannot be the slightest doubt; still less can there be any doubt that they are not the ordinary form of *R. Hydrolapathum*. They differ in the root-leaves, which are thinner in texture and more or less cordate at the base, though the latter character sometimes obtains in *R. Hydrolapathum*. The enlarged petals are more abrupt at the base, being truncate or even subcordate; denticulate at the margins at the base, and then contracted into an entire apex something like that of *R. obtusifolius*. But I still have my doubts if this be the *maximus* of most Continental authors. In the few German and Scandinavian specimens I possess of that plant the stem-leaves are more decidedly cordate at the base, less toothed in the upper part, less evidently contracted into an entire point—indeed, ovate-triangular would be the appropriate description of the foreign specimens, while deltoid, acuminated into a triangular point, would express the British *R. maximus*. The granule is considerably larger in proportion to the size of the petal in the British than in the foreign plant, while the whole aspect of the foreign plant suggests a deviation from *R. Hydrolapathum* in the direction of *R Hippolapathum*, Fries (*aquaticus*, Koch et Auct. plur. non Bab). The British plant, on the other hand, gives me the idea of a deviation from *R. Hydrolapathum* in the direction of *R. pratensis* or *obtusifolius*. Can it be that *R maximus* is a series of hybrids between *R. Hydrolapathum* and other Rumices, or is it a mere variety of *R. Hydrolapathum?* My attempts to raise this Dock from the seed of dried Continental specimens have failed to furnish me with seedlings, and it was not until this spring that I succeeded in raising them from the seeds of the Lewes plant; but this gives me some hopes that I may yet be able to judge from growing plants.—J. T. Boswell.

Salix rubra. "Bilbrook, Staffordshire, 17th April and 25th July, 1874."—Dr. John Fraser. This is not *S. rubra*, Huds.—*i.e.*, a plant probably hybrid between *S. purpurea* and *S. viminalis*. It is *S. Treverani*, Spr., one of the forms included by Wimmer under his *S. triandra-viminalis*.—J. T. Boswell.

Salix Smithiana, Willd. "Near Ednam, Roxburgh, April and August, 1875."—R. Brotherston. The satiny-white pubescence makes me think that this is rightly named, but the catkins look more like the comparatively small ones of *S. rugosa*, but this may arise from having been gathered before attaining their full size. *S. Smithiana* is readily distinguished from *S. rugosa* when growing, but is much more difficult to determine from dried specimens. *S. Smithiana* differs from *S. rugosa* in the leaves (which should be taken from the autumnal barren shoots of an unmutilated tree) being usually larger, less attenuated at the base, lighter green and smoother and more even above, whiter and more silky beneath. Also by the catkins being considerably larger and with larger and longer-haired scales.—J. T. Boswell.

Zannichellia forms. Mr. Baker has drawn up the following description of the varieties or subspecies known to be British, and Dr. Boswell has made valuable notes on two or three.—T. R. A. B.

Zannichellia palustris, *L.* The varieties or subspecies of *Zannichellia* represented in our flora appear to be four in number, viz.:—

1. *Z. brachystemon*, Gay. Carpels 2-4 to a flower. Shortly pedicellate. Pedicel usually about a quarter as long as the fruit, which is three-quarters to one line long, and crenate on the back. Style about half as long as the fruit. Stigma large, crenulate. Filament one-eighth to quarter inch long. Anther two-celled. This is the common inland form throughout the country. Here belong *Z. palustris*, Eng. Bot., edit. iii., t. 95, and of the "Herbarium Normale" of Fries, *Z. repens* of Boreau, and *Z. dentata* of Lloyd. *Z. repens*, Bonning., as figured, Reich., Ic. Fl. Germ., tab. 16, fig. 20, is a subordinate form with slender habit, pedicel none, a small carpel, and a very large stigma. *Z. major*, Bonng., Reich. Ic., vii., t. 16, fig. 24, a form of stouter habit with larger fruit crenulate on the back.

2. *Z. pedunculata*, Reich. Ic., vii., t. 16, fig. 21. Pedicel from

half as long to as long as the fruit. Carpel oblong-fusiform, three-quarters to one line long, strongly muricated on the back. Style nearly or quite as long as the carpel. Stigma large, crenulate. Stamens with a two-celled anther and filament a quarter to half-inch long. This is a not unfrequent coast-form, but I think runs into No. 1 by insensible gradations, and a plant gathered by Mr. Warren in Kensington Gardens should apparently be placed here. Here belong *Z. maritima* of Nolte, *Z. gibberosa*, Reich. Ic., t. 16, fig. 22 and 23, and *Z. pedicellata*, Eng. Bot., ed. 3, t. 926. The *Z. pedunculata* of the "Herbarium Normale" of Fries comes about midway between this and the last.

3. *Z. polycarpa*, Nolte; Reich. Pl. Crit., t. 757; Reich. Ic. Fl. Germ., t. 16, fig. 23. Carpels often 5 or 6. Pedicel none or very short. Carpel cylindrical, under a line long, crenulate on the back. Style not more than one-fifth to one-fourth as long as the carpel. Stigma large, repand. Stamens with a bilocular anther and filament not more than one-eighth to one-tenth inch long. The type has not yet been found in Britain. Dr. Boswell's Orkney plant is this, except that the style is a little longer and the tuberculation on the margin of the fruit is very faint or entirely obsolete, so that it recedes from the type in the direction of No. 1.

4. *Z. macrostemon*, Gay, *Z. palustris*, Boreau, Fl. du Centre, edit. 2, p. 603. *Z. digyna*, Brébisson. *Z. disperma*, Salzmann. Ovaries usually two, but sometimes three or four. Pedicel none. Fruit three-fourth to one line long, sausage-shaped, rarely crenulate. Style half as long as the fruit. Stigma small, not crenulate. Stamens with a four-celled anther, and filament from half an inch to an inch long. The only station within the bounds of our flora with which I am acquainted is, ditches of fresh water near the Shannon, two miles west of Wicklow, where it was gathered by Mr. Jno. Ball. It was pronounced to be the true *macrostemon* by Gay, and a specimen so labelled by the latter is in the Kew Herbarium. Gay's idea was that 1, 2, and 3 were varieties of one species, but that this was distinct. The figures of 1, 2, and 3 in Reichenbach's "Icones" are excellent, but I cannot refer to any satisfactory figure of this. It is probable that if the matter were taken in hand by the members of the Club, 3 or 4 would be found in fresh places. Nearly all the specimens which I have seen in British herbaria are in the fruiting stage, and we want a supply gathered a month earlier, so as to show the stamens.—J. G. BAKER.

Zannichellia (———?). "Round Pond, Kensington Gardens, Middlesex, July, 1875. This form deserves study. It seems intermediate between *eu-palustris* and *pedicellata*. The arrangement of the fruits round their common peduncle recalls the former, and even to some extent the Orkney plant distributed this year. But the length of styles and fruit-stalks would bring it rather to *pedicellata* had it been gathered from brackish, not purely fresh water. (Qy. Can it be *pedicellata* carried in here from the Thames and altered by a long colonisation in fresh water?)"—J. L. WARREN. As Mr. Warren says, this form is quite intermediate between *Z. eu-palustris* and *pedicellata*. It has the capillary leaves, short common peduncle, and style considerably shorter than the fruit which distinguish the former; but the nuts as conspicuously stipitate and the exterior membranous keel as dentate as in *Z. pedicellata.* Reichenbach in his "Fl. Germ. Excurs.," p. 7, describes a *Z. gibberosa* which may be the present form, but of this I have no specimens. Perhaps it is figured in Reichenbach's "Fl. Germ. et Helv.," but I have not access to that work. With regard to the Orkney *Zannichellia*, it differs from authentic specimens of Nolte's *Z. polycarpa*, by having longer styles with the stigma mostly deciduous, the nuts more slender and less connivent. It is precisely similar to specimens sent out to Mr. Watson by Prof. Reichenbach, under the name of *Zannichellia polycarpa, β. tenuissima*, Fries, from the Island of Zealand. The true *polycarpa* appears to have been collected in brackish water, as Mr. Watson has been good enough to present me with specimens collected by Prof. Reichenbach in Nolte's station, which are labelled, "In the Baltic Sea itself at Heiligenhavn." It should be looked for in the Lower Loch of Stenness, Orkney, in which the water is brackish.—J. T. Boswell.

Zannichellia "palustris." "Brook at Woodloes, near Warwick, October, 1875."—H. Bromwich. This appears to be the same form as the plant just noticed from Mr. Warren. It has the group o carpels pedunculate, and each carpel shortly stipitate.—J. T. Boswell.f

Ruppia rostellata, Koch. "Marsh Dykes, Faversham, Kent, September, 1875."—F. J. Hanbury. "Bidston Marsh, Cheshire, July, 1875."—R. Brown. This segregate is not named for either of these countries in "Topographical Botany."

Scirpus carinatus, Sm. "By the Tamar, near Gawton, Beer Ferris, S. Devon, 1875." Noticed from being from a recently-discovered station; it likewise occurs on the E. Cornwall side of the river, where it was detected last summer by Mr. Ralfs, of Penzance. I consider it a very unsatisfactory species, for whilst it sometimes has stems bluntly trigonous for nearly their whole length, at others they are round from two to three inches below the panicle, and they vary in shape even on the same root, the smaller stems as a rule being more conspicuously trigonous than the larger.—T. R. A. B.

Carex punctata, Gaud. "Cliff by Bigbury Bay, S. Devon, July and August, 1875." Grows rather sparingly on some low rocks under a cliff, where it is probably not unfrequently dashed with spray from the waves. It occurs mostly intermixed with coarse grassy vegetation, and *Carex extensa* may be seen near it. The locality is just four degrees west longitude.—T. R. A. B.

Psamma baltica, R. & S. "Ross Links, Northumberland, August, 1875."—Wm. Richardson; also sent by Mr. Brotherston, who observes: "If last season may be taken as an average one, it will be some time ere every botanist in the country gets an example of this plant. When I visited the station in August last I saw plenty of plants, but very few of them were flowering. The common species was the same in that respect. When seen growing together *P. baltica* is easily distinguished by the leaf; it is much broader and flatter than in *P. arenaria*, and the grass is altogether a stronger growing plant."

Bromus Benekenii, Lange. "Downhill, Glen Devon, Perth, September 2, 1875."—Tom Drummond. This is, I believe, the first undoubted native station recorded for this plant. Mr. Drummond has found it also in Glen of Sorrow, about three miles above Dollar, Clackmannanshire.—J. T. Boswell.

Triticum acutum, DC. "Sandy bank of the river Dee, near Heswell Point, Hundred of Wirrall, Cheshire, September 25, 1875. New to Cheshire."—Robert Brown.

Triticum "*acutum*, DC." "Littlehampton, West Sussex."—J. L. Warren. This is *T. pungens*, var. *a. genuinum*, E. B., ed. 3.—J. T. Boswell.

Chara hispida, Linn., var. *polyacantha*, A. Br. "Very abundant in a small lake near Thirsk, N. Yorkshire. New to Yorkshire. From the copiousness of the spines on some parts of the stem the specific characters are difficult to determine; but where the stem is less covered the spiral arrangement of the furrows and the position of the spines on the tubes are better seen. December 23, 1875."—Fred. Addison.

Chara fragilis, Desv. "Pool on Lizard Downs, W. Cornwall, July, 1873. I sent specimens of this to Professor Babington, who kindly examined them for me, and said that he considered them '*C. fragilis*; very fine and slender.' "—W. H. Beeby.

T. R. ARCHER BRIGGS.

June 24, 1876.

On a Disease of Olive and Orange Trees. By W. G. Farlow. (Bull. of Bussey Inst. and Amer. Journ. Sc. and Arts, July, 1876.)—This paper contains an account of a fungoid disease which in California obtains such mastery over the Olive as to prevent its producing any fruit, while Orange and Lemon trees attacked by it bear fruit, but of very inferior quality. In the case of the Olive, the disease attacks the twigs as well as the leaves, covering the parts with black spots, and causing the latter organs to become brown and shrivelled. Its mycelium consists of moniliform threads, apparently devoid of hausteria, which run over the surface of the epidermis and twine closely round the stem of the plant's stellate hairs. The reproductive organs are—offsets from the hyphæ, consisting of two cells which become isolated and germinate, Macrosporoid and Helminthosporoid bodies, picnidia, and flask-shaped stylospores, inside which are produced tetraseptate spores attached to short filaments lining the base and lower part of the sides of the flask. Precisely the same Fungus is found on the Orange, but in its case the mycelium can be readily scraped off, owing to the glabrous condition of the leaf. The author has ascertained that the picnidial form is identical with *Antennaria elæophila*, Mart., while the stylosporous state is *Capnodium citri*, Berk. & Desm.; and he thinks it probable that, although asci were not found, the Fungus is identical with *Fumago salicina*. He seems also to consider that insect-puncture has afforded a nidus for the germinating spores, but we venture to think that honey-dew, which is more widely diffused through the vegetable kingdom than is generally believed, has had more to do with it. The paper is extra-mycologically interesting, as showing how stellate hairs may be a positive disadvantage; we do not remember to have seen any illustration with an opposite import.

Botanical News.

Articles in Journals.—July.

Flora.—C. Luerssen, "Vascular Cryptogams of the voyage of the *Donau*" (contd.).—A. B. Franks, "On the biological conditions of the thallus of certain crustaceous Lichens."—W. Nylander, "Addenda nova ad Lichenographiam Europæam" (11 new Irish species).—K. Prantl, "What is confused under the term cambiform."—A. de Krempelhuber, "Lichenes Brasiliensis a Glaziou collect." (contd.).—J. E. Weiss, "On the mode of growth and position of the vascular bundles in *Piperaceæ*."—J. Reinke, "In defence" (against Sachs' criticisms).

Bot. Zeitung.—E. Reuther, "Researches on the development of flowers" (contd.).—H. Solms-Laubach, "Development of flowers in *Brugmansia Zippelii*, Bl., and *Aristolochia Clematitis*, L." (tab. 8).—J. Kühn, *Tilletia secalis.*

Œsterr. Bot. Zeitschr.—K. Mikosch, "On the organs of secretion in the Birch."—L. Celakovsky, "On *Cerastium pedunculatum*, Gaud."—R. v. Uechtritz, "On *Cerastium bulgaricum*."—A. v. de Lièvre, "*Ranunculaceæ* of the Flora Tridentina" (contd.).—J. Freyn, "On some Austro-Hungarian plants" (contd.).—A. Kerner, "Distribution of Hungarian plants" (contd.).—J. Dedecek, "Flora of neighbourhood of Prag; supplement."—E. Eder, "On the separation of watery vapour by plants."—F. Antoine, "Botany at the Vienna Exhibition" (contd.).

Nuovo Giorn. Bot. Ital. (July 10th).—G. de Notaris, "*Hepaticæ* collected in Sarawak, Borneo, by Beccari in 1865-7" (*Diploscyphus*, gen. nov.).—F. de Thuemen, "Fungi nonnulli novi Italici."—G. Licopoli, "Micro-chemical researches on the fruit of the Grape."—G. Cugini, "On the alimentation of Cellular Plants; part 2."—G. Archangeli, "On *Pilularia globulifera* and *Salvinia natans*" (tab 7-10).—A. Piccone, "On *Isoetes Duriæi*."—Id., "On the geographical distribution of *Polyporus Inzengæ*."—Id., "Supplement to Catalogue of Mosses of Liguria."

Journ. Linn. Soc. Lond. (No. 84, July 11th).—J. B. Balfour, "On a new genus of *Turneraceæ* from Rodriguez" (*Mathurina*).—H. Trimen, "Note on *Bœa Commersonii*, R. Br."—J. M. Crombie, "Lichenes capenses, collected by Rev. A. E. Eaton in 1874."—Id., "Lichenes Terræ Kerguelensi, collected by Rev. A. E. Eaton in 1874-5."—W. Mitten, "Mosses and Hepaticæ coll. by Rev. A. E. Eaton during the Transit of Venus Expedition."—P. H. Reinsch, "Species et Genera novi algarum aquæ dulcis quæ sunt inventa in speciminibus in ins. Kerguelensi a cl. Eaton coll. hieme 1874-5."—M. J. Berkeley, "Report on the Fungi of Kerguelen Island."—J. M. Crombie, "Lichens coll. by Dr. R. O. Cunningham in the Falkland Is., Fuegia, Patagonia, and I. of Chiloe, in the voyage of the *Nassau*, 1867-9."—J. Kirk, "Note on identity of East African Copal with the produce of the existing Copal-tree."—G. Dickie, "Algæ, chiefly Polynesian, collected in the voyage of the *Challenger*."—W. T. Dyer, "On the plant yielding Latakia Tobacco."—Id., "On the genus *Hoodia*" (tab. 5).

Original Articles.

NOTES ON MASCARENE ORCHIDOLOGY.

By S. Le M. Moore, F.L.S.

(Tab. 181.)

Having been engaged during the last few weeks in working up the Orchids of Mauritius for Mr. Baker's forthcoming Flora, I take the present opportunity of setting down a few notes which will probably interest some readers of the Journal. In doing so, however, I must crave leniency, for the task of interpreting the different arrangements of the parts in this family is sufficiently difficult when the flowers are fresh, and much more so when one has access only to dried material. These notes must therefore be regarded as mere suggestions, which will have to be invalidated, or confirmed and extended, by persons resident in the native haunts of the plants, and the object in publishing them will be gained if such should be the result.

Monœcism in Eulophia scripta, Ldl.—It was a fact well known to Richard (Orch. Maur., p. 48) that the flowers of *Eulophia scripta* present themselves in two forms recognised externally in this way—that in one case the ovary is somewhat swollen, while the ovaries of the other set remain thin and undistinguishable from their subjoined pedicels. This difference is associated with dimorphism in the column, which in the flowers of the first form is straight and stout with strongly developed lateral wings, has a length of ⅓ inch, and shows near its top a large viscid stigma crowned by what appears to be a rudimentary pollen-apparatus, though I was not able satisfactorily to make out the exact structure of this latter. On the other hand, flowers with slender ovaries have a shorter (¼ inch) slender incurved column with a rudimentary stigma associated with normal pollinia, and this form of column is further remarkable for bearing at its base two membranous folds which meet in the middle line and overlap so as to form a tube continuous with the spur of the labellum (fig. 1). These folds are not present, I believe, in the column of the large-ovaried flowers, though, as my experience is very limited, I do not wish to make any assertion in the matter. Their probable function is as directors of an insect's head against the rostellum, and their absence from the other type of column is explained by the fact that here there is no normal rostellum, but a large stigma, whose position enables it to receive pollen without any such aid. Further, the segments of the perianth in both these types are covered with large purple blotches, which on a yellowish-green ground contribute effectively in rendering the flower attractive; but there is a form figured by Thouars (Orch. Afr., t. 45) under the name of *E.* (*Limodorum*) *concolor*, which differs from the blotched form only in having its perianth of an uniform tint. It has occurred to me that this may possibly be the hermaphrodite state of *E. scripta*, though unfortunately I cannot decide the point, my only knowledge of *E. concolor* being derived from the above-quoted figure of Thouars. We have here a probable analogue of the assumption of brilliant plumage by birds, but with this difference, that with birds the couple in presence of which the modifications of colour have been induced is made up of the separated sexual elements, while in the plant we have hermaphroditism and unisexuality. As the blotching on the flower is assumed in order to render it attractive to insects, this instance should rather be compared with the rare case where the female has become adorned in order to render her attractive to the male.

Fertilisation in the bud.—This arrangement, shown by Darwin to occur in *Cephalanthera*, and by Fitzgerald in two species of *Thelymitra*, appears to exist in three genera belonging to the Mascarene region. In *Polystachya zeylanica*, Ldl. (*P. luteola*, auct. div.), some of the flowers have, up to the time of expansion, slender ovaries which cannot be distinguished from their pedicels; in others the ovary is swollen while the flower is still very small, and some time before it has opened. The same thing was observed by Ayres in *Phajus villosus*, Rchb. f., who called the plant *Calanthe inaperta*, affording by this sufficient proof of external difference between closed and open flowers. The third case I have not seen; the subject of it is the plant figured by Thouars (l.c., t. 50) as *Angræcum inapertum*. In *Cephalanthera* Mr. Darwin found that but few seeds are produced when the flowers are self-fertilised; the contrary appears to be the case with the *Polystachya*, which, combining with it the scarcely distinguishable and equally bud-fertilised *P. luteola*, Hook., has one of the widest distributions known among Orchids.

On methods for ensuring cross-fertilisation.

(*a.*) In *Angræcum* and its allies.—The genera referred to here are *Angræcum*, *Aëranthus*, and *Listrostachys*, which, following Reichenbach, I have distinguished according to the structure of the pollen-apparatus. In *Angræcum* the caudicle is single; in the other two it is double, *Listrostachys* having one gland, while *Aëranthus* has two. It will be seen that this is a purely artificial arrangement, the structural differences having little functional import, except perhaps in the case of *Aëranthus*, where one can imagine a certain advantage to be derived from the singleness of the pollen-attachment, each pollinium having the chance of going twice or nearly twice as far as when both of them are attached to one gland, provided that there be a sufficient number of fertilising insects. The varying structure of the labellum and rostellum in these genera is, however, worthy of notice, and will be dealt with in a few words. Each of these organs has three forms—the labellum being either flat, concave, or convolute round the column, while the rostellum consists either of two broad foliaceous lobes (fig 2), or the thick lobes are united, so as to form a strong cone (fig. 3), or else it is strap-like, and projects over the entrance to the spur (fig. 4). The flat or the concave labellum is usually associated with the foliaceous rostellum, the latter partially filling up the entrance to the spur, in which aim it is aided in *Aëranthus sesquipedalis* and in

Angræcum eburneum and *superbum* by outgrowths from the labellum itself, which appear in the first-named in the form of two lateral tubercles, one on each side, and in the other two of a single median lanceolate fleshy plate. Worthy of notice, too, is the space between the lobes of the rostellum (fig. 2), seen best in flowers which are provided with a long slender *curved* spur; the curve or curves being often very sharp and trending forwards, an insect, in order to get to the bottom of the spur, would probably be forced to move its head against the edge of the anther-cap, detaching the latter and getting the viscid gland or glands attached to its head. The cone-like rostellum is found in a few rare cases where the labellum is wound round the column; as it is very strong and curved upwards, it seems admirably adapted to resist pressure from above, as of an insect struggling to force its way down to the nectar contained in the short spur. On the other hand, a forward-projecting rostellum is not required here, the space between labellum and column being very slight, and totally filled by the insect's body during sipping of the nectar. I can call to mind only two plants with this structure, *Listrostachys polystachys*. Rchb., found in Madagascar, Bourbon, and Mauritius; and a new species from Rodriguez, closely allied to it, and I venture to think that they should be separated generically. The liguliform rostellum is usually found where the entrance to the spur is wide; over this it projects, often extending a considerable way beyond the spur on to the limb of the labellum.

(*b.*) In *Listrostachys Pescatoriana*. The flower of this plant (fig. 5) would appear to be fertilised in a very unusual manner. The labellum is clawed, and at the junction of limb and claw is the small orifice of the spur. In consequence of the presence of this claw the anther is evidently placed too far behind the spur for an insect to remove the pollinia while sipping nectar; but the small flowers are much crowded, so that it seems possible for an insect, while sipping from one flower, to draw out pollinia from another, and deposit them on the stigma of a third.

(*c.*) In *Cynorchis* (figs. 6 and 7).—The most striking point in this Ophrydeous genus is the large, erect, fleshy rostellum (*r*), either contiguous to the arms of the anther (fig. 6) or distant from them (fig. 7); the anther-arms are very long, and the anther-case is placed far back on the column, so that the caudicles are very much elongated. The only use that one can see for this curious rostellum is that it serves to keep straight the released but not yet firmly-fixed pollinia, which, were it not for this provision, might run the risk of coming in contact with foreign parts, and of being rubbed off upon them and so lost, an accident to which, considering the great length of the caudicles, one might suppose these pollinia to be somewhat liable. Further, in *C. fastigiata* each of the laterally-placed stigmatic lobes (fig. 6, *s.*) may perhaps help in the same way as the rostellum, each caudicle finding at its pollen-end an external wall, and at its gland-end an internal one. On the other hand *C. purpurascens* (fig. 7) has its stigmatic lobe placed below the arms of the anther, so that its caudicles have only one wall, an internal one, guarding their central portion from straying. A third species of this genus from Mauritius (*C. Boryana*, Ldl.) I know only from

Richard's figure (Orch. Maur., t. 5.), which shows neither rostellum nor stigma.

Curve of the peduncle and fall of the sepals and petals.—The last note relates to *Phajus tetragonus*, Rchb. f., in which the sepals and petals fall off soon after expansion, the pedicel becoming recurved, and by this movement detaching and drawing up the convolute bract. This trait is well-known, having been remarked on in the text accompanying t. 4442 of the Bot. Mag., but the point not cleared up relates to the circumstances under which the action takes place, and principally as to whether it occurs before or after fertilisation. If the former, the large and gaily-coloured sepals and petals must be regarded as useless structures, and therefore liable to elimination; in fact, themselves affording an instance of the commencement of a curious type of elimination, viz., detachment bodily of the full-grown parts immediately growth is finished, the supposition that the parts are full-grown being founded on observation of other species of the same genus. On the other hand, if, as is more probable, the fall of sepals and petals takes place after fertilisation, we have here another member to add to the already long list of plants which cast away parts, no matter how useful before, immediately on the accomplishment of the *rôle* of the latter.

In conclusion, I have only to repeat the expression of the hope that these and numerous similar points will receive elucidation at local hands.

Explanation of Tab. 181.

Fig. 1.—Spur and base of the column and labellum of the male flower of *Eulophia scripta*, Ldl., showing the two folds (*f*) at the bottom of the column, and the two crests on the labellum (*l*).

Fig. 2.—Column of *Aëranthus sesquipedalis*, Ldl. (copied from the Bot. Mag., t. 5113).

Fig. 3.—Column of *Listrostachys polystachys*, Rchb. f.

Fig. 4.—Column of *Angræcum aphyllum*, Thouars, with labellum attached.

Fig. 5.—Flower of *Listrostachys Pescatoriana*, S. Moore, from a drawing in Herb. Ldl.

Fig. 6.—Column of *Cynorchis fastigiata*, Thouars.

Fig. 7.—Column of *C. purpurascens*, Thouars.

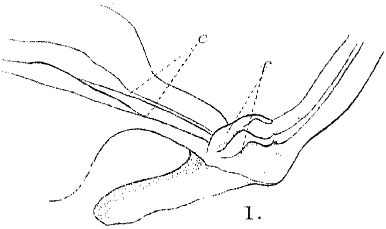
Figs. 4 and 5 several times magnified; the rest about natural size.

In all figures *a* marks anther-case, *c* column, *r* rostellum, *s* stigma, *g* gland, *a'* arms of the anther, and *sp* spur.

ON THE ORCHIDS COLLECTED AT THE ISLAND OF BOURBON, DURING THE TRANSIT OF VENUS EXPEDITION, BY DR. I. B. BALFOUR.

By S. Le M. Moore, F.L.S.

A fortnight's stay at Bourbon enabled Dr. Balfour to obtain good gatherings of Orchids. In one or two cases he has brought back Thouarsian types which have probably not been seen since their first publication, as well as some very rare and some new species. The list is as follows.



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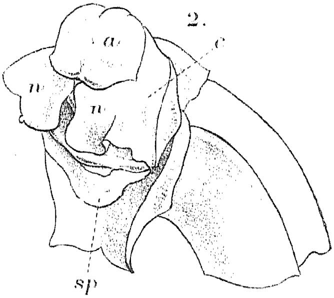

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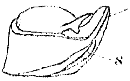

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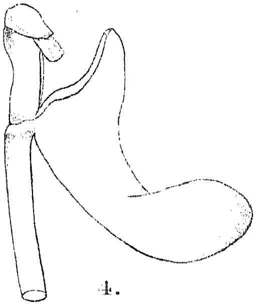

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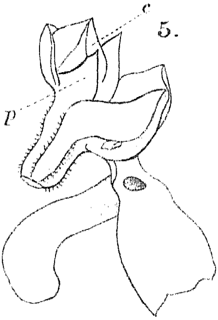

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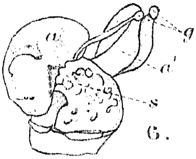

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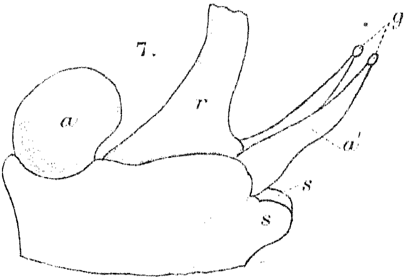

7.

S.le M.Moore del. Blair lith.
Mintern Bros. imp.

Mascarene orchidology.

Satyrium amœnum! Ldl. (*Diplectrum*, Thouars Orch. Afr., t. 21).

Habenaria Richardiana, Herb. Rich.

Peristylus latifolius, Ldl.

P. secundiflorus, Boivin.

P. spiralis, S. Moore (*Satyrium spirale*, Thouars l.c., t. 9).

P. flexuosus! S. Moore (*Gymnadenia*, Rich., *Satyrium flexuosum*, Thouars l.c., t. 7).

P. SACCULATUS, *Balf. f. et S. Moore*, folio unico a nobis viso parvo ovato-oblongo acuto basi leviter angustato, scapo elato tenui sparse scarioso-vaginato, floribus ad apicem scapi laxe subcongestis, bracteis ovatis acutis pedicello paullo longioribus, sepalis oblongis obtusis, petalis lanceolatis, labello ovato-lanceolato trilobo lobis lateralibus brevibus obtusis lobo medio elongato acuto anguste triangulari, calcare labellum superante apice leviter sacculato.——Radix non vidimus. Folium $\frac{3}{4}$ unc. long., $\frac{1}{3}$ unc. lat. Scapus 1 unc. alt., sulcatus. Bracteæ $\frac{1}{12}$ unc. long. Sepala, petala et labellum $\frac{1}{12}$ unc. long.; calcar $\frac{1}{3}$ unc. long. Ovarium oblongum, utrinque angustatum, mox incrassatum.

Cynorchis purpurascens? Thouars.

DISA (§ *Micranthæ*) BORBONICA, *Balf. f. et S. Moore*, caule basi folioso sursum vaginato, foliis linearibus apice sensim angustatis, vaginis ample ovato-lanceolatis imbricatis ovaria superantibus vel subæquantibus, sepalis lateralibus oblongis, sep. dorsali ovato-oblongo calcar breve obtusum emittens, petalis lanceolatis labello subsimilibus, antheris oblongis, erectis.——Herba 8 unc. alt. Folia 2-3 unc. long., basi vaginantia. Bracteæ $\frac{1}{2}$-$\frac{3}{4}$ unc. long., concavæ. Perigonii segmenta circiter $\frac{1}{5}$ unc. long., calcar $\frac{1}{5}$ unc. long. Ovarium crassum, oblongum.

Liparis gregaria, Ldl.

L. vaginata? Rich. The type-specimen in Lindley's Herbarium is without flowers; Boivin's *L. caulescens* is probably the same thing.

Bulbophyllum nutans, Thouars.

Aëranthus gladiifolius, Rchb. f.

A. fragrans, Rchb. f.

A. macrostachys! Rchb. f.

Angræcum triquetrum! Thouars l.c., t. 49.

A. caulescens, Thouars, var. *multiflorum* (*A. multiflorum*, Thouars l.c., t. 74).

A. ramosum? Thouars l.c., t. 59. Specimen exactly as in the figure—without flowers or fruit.

A. striatum! Thouars l.c., t. 72.

A. carpophorum? Thouars. Flowers too old for accurate determination.

A. BRACTEOSUM, *Balf. f. et S. Moore*, foliis oblongo-loratis oblique emarginatis crassis ad caulem brevem robustum imbricatis, racemis foliis multo brevioribus subflexuosis circiter 6-floris, bracteis amplis ovatis pedicellum superantibus, sepalis petalisque lanceolatis, labello perigonii segmentis reliquis subsimili calcar breve saccatum gerente, rostelli lobis oblongis decurrentibus.——Caulis $1\frac{1}{3}$ unc. alt., basi radices crassas emittens. Folia 5-7 unc. long., $\frac{3}{4}$-1 unc. lat., nervosa. Racemi $1\frac{1}{2}$-2 unc. long.; bracteæ $\frac{1}{2}$-$\frac{3}{4}$ unc. long., pedicellis 3- v. 4-plo longiores. Perigonii segmenta $\frac{1}{2}$ unc. long. Anthera parva; pollinia ovoidea; glandula a nobis non visa.

The flowers are somewhat rotten, so that it is impossible to find the gland still attached to the caudicle, but there can be no doubt as to the genus to which this should be referred.

Calanthe sylvatica, Ldl.

Calanthe sylvatica, Ldl., var.? foliis angustioribus, floribus minoribus, &c.

TWO NEW CHINESE GRASSES.

By H. F. Hance, Ph.D., etc.

1. Eriochrysis porphyrocoma, *sp. nov.*—Vaginis apicem versus margineque pilosis, ligula oblonga albo-villosa, folio summo subulato brevi scabro, culmo apice dense tomentoso, paniculæ angustæ pedalis rachi angulata villoso-tomentosa radiis 4-6 verticillatis simplicibus erectis articulatis sed satis tenacibus bipollicaribus, spiculis binis oblongis pilis plus minus saturate purpureo-suffusis iis æquilongis cinctis altera pedicellata decidua altera sessili magis persistente utraque biflora hemiologama, pedicello piloso spiculam sessilem subæquante, glumis cartilagineis glandaceis margine dense ciliatis inferiore 5-7 nervi glabra superiore 3-5 nervi nunc hirtula carinata, flosculis muticis 1-nervibus inferiore 1-valvi neutro superiore 2-valvi hermaphrodito.

In provincia Cantonensi, secus amnem Lien chau, m. Octobri, 1875, invenit domina Galbraith. (Herb. propr., n. 19285.)

Of this handsome Grass I have seen half-a-dozen specimens, all unfortunately gathered without the lower portion of the culm or fully developed leaves. The small genus to which it belongs was long supposed to be monotypic, the original species, *E. cayennensis*, Beauv.!, being found in Mexico, Brazil, Venezuela, and the West Indian islands. Trinius* subsequently added to this an Indian species, and Steudel† afterwards two others of similar origin (carelessly repeating one of the three under *Saccharum*), from the manuscript, of the late celebrated agrostologist, C. G. Nees v. Esenbeck; and Munro‡ still later a fourth from South Africa. I have seen neither of these; but the Chinese plant appears to be well distinguished from each, so far as can be judged from the characters assigned them. From its American congener it differs much in habit, resembling somewhat *Eulalia capensis*, Munro! Since the detection of the Manchurian and North-Chinese *Imperata* (*Triarrhena*) *sacchariflora*, Maxim.!,§ the technical distinction between *Eriochrysis* and *Imperata* is reduced to the hardened texture of the glumes, as contrasted with the membranaceous ones of the latter genus.[*] Nor is *Eriochrysis* much better distinguished from *Erianthus* by its cartilaginous glumes and the muticous lower glumella of the fertile floret; the frequent suppression of the awn in the closely allied genus *Sorghum* shows the slight value of this appendage. The Andropogoneous genera have received special attention from several eminent agrostologists; Trinius,[†] Grisebach,[‡] and Munro,[§] having each given analytical claves of their distinctive characters. Though differing *inter se* in details, and even in the precise circumscription of the group, it is impossible, I think, for an unprejudiced student of these valuable and instructive synopses not to see on what excessively slight grounds many genera are still retained, differences of texture in the glumes and absence or presence of an arista being assigned too high a value. In *Saccharum spontaneum*, Linn. (which I cannot agree with Trinius as considering identical with *S. ægyptiacum*, Willd.), whereof I have examined specimens recently detected in Kwang tung province, the lower third of the glume is quite as cartilaginous as in *Eriochrysis*.[‖] Trinius, indeed, combines *Erianthus* with *Saccharum*, remarking—"*Erianthus* haud magis differt a *Saccharo* quam *Andropogon* ab *Anathero*. Acicula adeo abbreviata in *S. arundinaceo* ut spiculæ muticæ videantur." Grisebach keeps up both *Erianthus* and *Saccharum*, but then he also maintains *Anatherum*, distinguishing it solely by the awn, when present, being straight. Again, while the continuous or jointed inflorescence-rachis is employed by Trinius as the special character for separating the *Andropogoneæ* into two primary divisions, Grisebach refuses to accord it even generic value. One must possess a *foi robuste* in order to maintain that these genera are of equal value throughout, or that the characters made use of are assigned uniform importance in each particular instance; and this I regard as a very serious defect in the classification of a single group, in itself undoubtedly natural. I presume no one will contest the statement that no instance occurs in any Dicotyledonous order of dozens of genera the limits of which scarcely any two experts agree upon; in them the worst evil is that subgenera and sections are by analytical botanists too often raised to generic rank; whilst in Grasses each particular author's genus in a multitude of cases is built up of "pickings and stealings" (*sit venia verbis*) from those of another; there are no definite or well-marked limits between them recognised by the consensus of students of this order.

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* Mem. Acad. imp. sc. St. Pétersb. 6e. sér. ii., 315 (1832).

† Synops. pl. Gram., 411.

‡ Harvey Gen. So. Afr. Pl. ed. 2, 440.

§ Maxim. Prim. Fl. Amur., 331.

2. PHYLLOSTACHYS NEVINII, *sp. nov.*—Rhizomate procurrente pallido 3-4 lin. diametro intervallis 9-12 lin. nodoso fibras crebras culmosque edenti, his fistulosis levissimis e viridulo stramineis semi-

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[*] In E. A. Remy's "Essai d'une nouv. classif. des Graminées" (Paris, 1861), a somewhat pretentious but worthless work, with a singularly artificial arrangement of the genera, and which irresistibly suggests the notion of its having been drawn up exclusively from books, and not from the actual study of Grasses themselves, *Eriochrysis* is stationed between *Piptatherum* and *Pentapogon!*

[†] Op. jam citat., 243.

[‡] Nachricht. k. Götting. Gesellsch., Feb., 1868, 88.

[§] Op. cit., 431.

[‖] I find this had already been noted by Kunth in his careful analytical description (Supplem. Agrostogr. Synopt., 385).

teretibus faciebus alternis leviter sulcatis nodis acutis glaberrimis, foliis 2-3 fasciculatis 3-6 poll. longis lineari-oblongis acutissimis supra levibus lucidulis subtus pallidis opacis asperiusculis basin versus cum petiolo brevissimo marginato hirsutulis margine utroque scabro-serrulatis nervis secundariis utroque latere 5 venulis transversis subtus subtiliter depresso-tessellatis, vaginis glabris ore auriculis obtusis ciliatis setas rigidas subulatas gerentibus auctis, paniculis amplis decompositis foliosis rachi primaria flexuosa internodiis glaberrimis ramis primi ordinis surculorum spathis vaginantibus deciduis ad 4 poll. longis scarioso-membranaceis multinervibus basi annulo dense tomentoso cinctis margine ciliatis apice truncata ligula intus auctis setis plurimis coronatis laminaque brevi lanceolato-subulata primum inclusis, spicis sæpe aggregatis 1-2 poll. longis spiculas 6-9 gerentibus basi squamis brevibus coriaceis levibus lucidis acutis stipatis, spiculis 2-3 floris, flosculis pedicellis $\frac{3}{4}$ lin. longis tomentosis fultis summo tabescente, glumis persistentibus apice appendice parva lanceolata coronatis multinervibus apicem versus sæpe hirtellis superiore plerumque duplo minore sed forma et magnitudine non parum variantibus, glumellis lanceolatis dorso hirsutis inferiore acuminata 5-nervi superiore bimucronata, lodiculis lanceolatis dense ciliatis ovarii verticem adtingentibus, staminum longe exsertorum antheris pallidis basi sagittatis 3 lin. longis, ovario ovato-trigono stipite semilineali fulto stylo superne trifido.

In insula Danorum, Whampoæ, d. 17 Martii, 1876, copiose florentem legit Rev. J. C. Nevin, cui dicavi. (Herb. propr. n. 19337.)

This is at once distinguishable from *P. bambusoides*, Sieb. et Zucc. !, of which Zuccarini has given excellent analytical figures,* by its much smaller narrow glumes and the anthers only half as long, as well as by its leaves being roughened on both edges. It is apparently much closer to the imperfectly known *P. Stauntoni*, Munro,† which, however, is described as possessing long membranaceous bracts below the spikes, and very deciduous glumes. In the present plant, of which I have examined a very large suite of specimens in every stage of growth, whilst the glumes are persistent, it is only on the quite young herbaceous shoots or suckers that the long sheaths I have described are found, the branches of the mature fully-developed inflorescence being covered at their base with hard empty scales, just like those of *P. bambusoides*, except that they are acute. General Munro's description of this last, I may remark, was drawn up from specimens communicated by myself to Kew, the n. 2073 he quotes being that of my own herbarium, my friend De Grijs, who collected it, having distributed no plants with numbers. M. Maximowicz wrote me from Nagasaki in October, 1863—"The large *Bambuseæ* do not blossom in Japan, unless in years of drought; and the one in which Siebold gathered his *Phyllostachys* lives to this day in the people's memory as one of horrible sufferings." In curious contrast to this statement, the plant just described, which grows within a stone's throw of my residence, has flowered, for the first time to my knowledge, in a season unparalleled in the memory of

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* Abhandl. Acad. Münch. iii., t. 5.

† Monogr. Bambus., 37.

any native for its excessive and, as regards the time of year, altogether abnormal rain-fall, and seriously detrimental in consequence to agriculture. I may here notice that four *Bambuseæ* described by the late Dr. Ruprecht*—*Chusquea anelytroides*, *C. Meyeriana*, *Merostachys Fischeriana* and *Riedeliana*—have been inadvertently overlooked by Munro in his monograph.

I am indebted to the Rev. J. C. Nevin for accurate and neatly executed analytical drawings of both the above Grasses.

In expressing publicly an earnest hope that General Munro may ere long find leisure to render available to botanists generally the results of his unrivalled acquaintance with this family, by the publication of "a full account of all Grasses at present known in collections," which fifteen years ago he himself led us to look for,† I have reason to know that I but act as spokesman for a very numerous body of students.

FURTHER NOTES ON SMALL-FRUITED PEARS.

By M. T. Masters, M.D., F.R.S.

Since I wrote concerning certain small-fruited Pears in the August number of the Journal (p. 225) two additional communications have reached me on the subject. One may be deemed wholly satisfactory. The other is so far satisfactory that it may serve the interests of truth by throwing a doubt upon the Persian origin of the forms in question. Of course in so doing the romantic history narrated on the authority of Dr. Phené is partially, but only partially, impugned.

It may suffice to repeat here that there is very good reason for asserting that the *Pyrus communis*, var. *Briggsii* of Syme, which was found near Plymouth by Mr. Briggs, as formerly detailed, is the same form as that found in some parts of Anjou, Brittany, and the Gironde, and which is known to French botanists as *P. cordata*, Desv. There is also a Persian form, called by Buhse *P. Boissieriana*, referred by no less an authority than M. Decaisne to *P. cordata*, Desv. Such were the facts, leaving aside the inferences founded on them, as known to me when I last wrote.

Shortly afterwards Mr. Briggs was kind enough to forward for my inspection several specimens of what he thinks is the same form as that he originally met with. As these specimens are from barren shoots without flowers or fruits, it is, of course, not absolutely certain that they belong to the same form, though the similarity of foliage is so great that it seems in the highest degree probable that they do.

"These recently-found bushes grow by an ancient lane above the coast between Seaton and Love, East Cornwall, eleven or twelve miles from Egg-Buckland (the original locality), and there seems to be good reason for considering the shrub indigenous at this new spot.

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* Bull. Acad. St. Pétersb. viii., n. 21 (1841).

† Journ. Linn. Soc. vi., 33.

One bush is very old and rather stunted, having been rendered the more scrubby from having had the branches cut off on the lane side of the hedge at different times. The other example of the Pear, comparatively a young one, grows about one-eighth of a mile from the one just mentioned on the other side of the lane, and not in the hedgerow, but on the side of the hedgebank, only a little above the level of the lane, hence in a spot where we may reasonably conclude that it sprang from seed, especially as I could find none of it in the hedgerow above." In these terms Mr. Briggs writes to me, and on comparing the specimens with which he has now favoured me with those formerly distributed by him, and with the Brittany specimens referred to in my previous communication, I can but come to the conclusion that, so far as the evidence before us justifies an opinion, they all belong to one and the same form.

The second communication to which I referred consisted in the transmission of the type-specimen of *Pyrus Boissieriana*, Buhse, n. 1046a. For this I am indebted to the great kindness of M. Boissier. On comparing this with the French and with the Devonshire and Cornwall specimens, I can but conclude that as species and varieties go nowadays the Persian plant is quite distinct from the others. It is not necessary to give descriptive details, as those given by Buhse and by Boissier and already cited by me are strictly accurate. Speaking in general terms, the leaves and fruits are larger in the Persian than in the French or in the English specimens. The expressions made use of with reference to the size of the fruit, "ceraso vix majora" (Buhse) and "magnitudine cerasi" (Boissier), are justified by the examination of the specimens, and are much more applicable to the Persian fruits than they are to the others.

It now remains to see how Dr. Phené's fascinating speculations are affected by these facts. First, as the identity of the Western French specimens and those of South-western England is rather confirmed than otherwise, so the Arthurian origin of the small-fruited Pear in Cornwall is strengthened proportionately. But as to the Persian origin of these forms the evidence is decidedly weakened, though it is still quite within the bounds of possibility that the plant has migrated from Persia, and that the existing differences are referable to climatal variations extending over centuries.

M. Boissier also sent specimens of a second Persian small-flowered form (in flower) from M. Bunge's herbarium without name, but gathered near Schahrud in May, 1858. The leaves of this are almost exactly similar to those of the French *P. cordata* and to some of those of the Devonshire specimens. The form of the petals, however, is very different from that of Mr. Briggs's plants, and the sepals and flower-tube are almost glabrous instead of being covered with rusty tomentum, as in the Plymouth specimen.

NOTES ON THE BOTANY OF THE EXPERIMENTAL GRASS-PLOTS IN ROTHAMSTED PARK, HERTS.

By W. B. Hemsley.

Most English botanists are acquainted with the extensive series of experiments which Mr. Lawes, assisted by Dr. Gilbert, has been conducting on his estate at Rothamsted for upwards of thirty years. Independently of their value in practical agriculture, these experiments possess great interest for the student of botany, whether systematist or physiologist. Indeed, it would be difficult to overestimate their value. Besides these experiments in the open fields, it is only necessary to mention the results of the laboratory work, published under the titles, "On the Sources of the Nitrogen of Vegetation; with special reference to the question whether plants assimilate free or uncombined Nitrogen,"* and a "Report upon some Experiments undertaken at the suggestion of Professor Lindley to ascertain the comparative Evaporating Properties of evergreen and deciduous Trees,"† to show the importance of the labours so patiently and perseveringly continued at an immense outlay, and during a period when comparatively few scientific men, in this country at least, took any real interest in the issues. Even now it is doubtful whether Mr. Lawes receives that sympathetic support which is due to him and his coadjutors for their contributions to science. The greatest reward a man can enjoy, however, is the satisfaction he feels at having discovered a new fact; and a proof of Mr. Lawes's earnestness in his investigations is found in the provision he has made for the continuation of this experimental research after his death. Many of the field experiments were originally instituted to ascertain in what form certain essential elements in the food of plants could be most advantageously applied. That is to say, in such a form that plants could assimilate them, and at an outlay that would prove profitable to the farmer.

It is not the purpose of the present writer to enter into these questions in detail here, but rather to point out some of the features of one particular set of experiments which specially come within the domain of what may be termed the biological botanist.

For a number of years many of the experiments at Rothamsted, notably those on the herbage of permanent meadow land, which alone will be considered here, have been carried on for purely scientific purposes. As in all investigations, the results of which have not been reduced to plain facts, some little time and patience are necessary to obtain a grasp of the subject, especially as the questions at issue are numerous. There are some twenty variations of what may be termed the same experiment; but in order to appreciate their full significance it is only necessary to bear in mind that the investigations, so far as the nutrition of the plant are concerned, are limited to the presentation, in diverse combinations, of the elements nitrogen, phosphorus, potassium, sodium, &c., or those elements which are indispensably necessary in the life of the plant, and of which the soil is soonest exhausted. The elements, in short, which must be supplied by man to ground under constant cultivation, in contradistinction to such elements as carbon and the constituents of water, the supply of which is inexhaustible.

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* Philosophical Transactions, part ii., 1861.

† Journal of the Horticultural Society of London, vol. vi, parts 3 and 4 (1861).

It is also important to remember that these elements, especially the metals, some of which are known to be intimately associated with the activity of certain vital functions, as iron in the production of chlorophyl, and potassium in the assimilating powers of the latter, form together only a very small proportion of the total weight of vegetable organisms. It has also been asserted by some physiologists that plants are unable to attain their proper development in a soil or atmosphere overcharged with certain elements. Be that as it may, a glance at the large wall-case exhibited by Mr. Lawes in the Loan Collection at South Kensington, or a visit to the experimental ground at Rothamsted, will at once impress the mind with the strikingly different results obtained in the character and quantity of the herbage under the influence of diverse manures. Having been employed by Mr. Lawes for some time on these experiments, the results of which have not yet been sufficiently elaborated for publication, I thought botanists would welcome some notes on the flora of the area under experiment, as they might render the forthcoming exhaustive memoir more interesting and intelligible, and at the same time draw more general attention to the experiments themselves.

Although the results of my work and that of others, which, of course, belong to Mr. Lawes, have only partially been made public, that gentleman kindly assented to my request to be permitted to use some of the knowledge obtained while in his service. Naturally I shall avoid giving information here that would detract from the interest of the approaching report. My object is rather to create a desire in some botanists to make themselves familiar with the nature and significance of these experiments, because I believe that they furnish the material for solving various problems and interesting questions in plant life—problems requiring much time and some scientific training to work them out. In fact, my experience at Rothamsted was that every fresh step suggested some new line of inquiry.

Within the limits of this article I can only run over the surface of the prominent features of the composition of the vegetation of the experimental grounds. To attempt to give in a few words an idea of the whole subject would only be confusing.

From time to time Messrs. Lawes and Gilbert have published various reports on these experiments in the "Journal of the Agricultural Society," the principal one relating to analyses of the proportions, or percentages, of the various species constituting the herbage of each plot. To this paper the reader is referred for much information relative to the manuring and the general effects at that date. The meadow-land under experiment is a portion of Rothamsted Park, about seven acres in extent, and nearly level. The soil is a somewhat clayey loam, and appears to be tolerably uniform throughout, with a clayey subsoil of several feet in depth, immediately overlying the chalk. Respecting its condition when the experiments were commenced, it is stated in the annual memoranda sheet issued by Mr. Lawes, "The land has probably been laid down with grass some centuries. No fresh seed has been artificially sown within the last forty years certainly, nor is there record of any having been sown since the grass was first laid down. The experiments commenced in 1856, at which time the character of the herbage appeared uniform over all the plots." The ground was not thoroughly botanised at the outset, and therefore it is not on record what species originally grew on each plot; but it is not difficult to prove, as stated above, that the herbage was pretty uniform over all the plots.

In 1862 the first attempt at a separation of the species of average samples of the hay of each plot was undertaken, and this was on the whole successful; but from some difficulties which will be explained further on, some of the details are not quite accurate. However, the errors are so trifling as to barely affect the main issues. A report of the results appeared in the "Journal of the Royal Agricultural Society," vol. xxiv., part 1. In 1867 another set of samples was taken and analysed, again in 1872, and I believe it is the intention of Mr. Lawes to have the fourth set taken next season. On each occasion the ground has been thoroughly botanised, and notes made on the character of growth exhibited by each species on the different plots where it occurred. In 1872 I spent at least six weeks on these plots, and carefully examined every inch of the ground of each plot, and enumerated the plants constituting the herbage.

The exact composition of the herbage of the unmanured plots will doubtless be of great interest to botanists, and serve as a standard for comparison with floras of similar areas in other parts of the country. In the first place, I will give a complete list of all the plants hitherto observed growing on the whole area of about seven acres.

1. *Ranunculaceæ.*

1. Ranunculus acris, 2. R. repens, 3. R. bulbosus, 4. R. auricomus, 5. R. Ficaria.

2. *Cruciferæ.*

6. Cardamine pratensis.

3. *Caryophylleæ.*

7. Stellaris graminea, 8. Cerastium triviale.

4. *Hypericineæ.*

2. Hypericum perforatum.

5. *Leguminosæ.*

10. Ononis arvensis, 11. Trifolium repens, 12. T. pratense, 13. T. procumbens, 14. Lotus corniculatus, 15. Lathyrus pratensis, 16. Vicia Cracca, 17. V. sepium.

6. *Rosaceæ.*

18. Potentilla reptans, 19. P. Fragariastrum, 20. Alchemilla vulgaris, 21. Agrimonia Eupatorium, 22. Poterium Sanguisorba, 23. Spiræa Ulmaria.

7. *Umbelliferæ.*

24. Conopodium denudatum, 25. Pimpinella Saxifraga, 26. Heracleum Sphondylium, 27. Anthriscus sylvestris.

8. *Rubiaceæ.*

28. Galium verum, 29. G. Aparine.

9. *Dipsaceæ.*

30. Scabiosa arvensis.

10. *Compositæ.*

31. Centaurea nigra, 32. Carduus arvensis, 33. Bellis perennis, 34. Achillea Millefolium, 35. Chrysanthemum Leucanthemum, 36. Senecio erucæfolius, 37. Hypochæris radicata, 38. Tragopogon pratensis, 39. Leontodon hispidus, 40. L. autumnalis, 41. Taraxacum officinale, 42. Hieracium Pilosella, 43. Sonchus oleraceus.

11. *Plantagineæ.*

44. Plantago lanceolata, 45. P. media.

12. *Scrophularinæ.*

46. Veronica Chamædrys, 47. V. serpyllifolia.

13. *Labiatæ.*

48. Thymus Serpyllum, 49. Prunella vulgaris, 50. Ajuga reptans.

14. *Primulaceæ.*

51. Primula veris.

15. *Polygonaceæ.*

52. Rumex Acetosa, 53. R. obtusifolius, 54. R. crispus.

16. *Orchidaceæ.*

55. Orchis Morio.

17. *Liliaceæ.*

56. Scilla nutans, 57. Fritillaria Meleagris, 58. Ornithogalum umbellatum.

18. *Juncaceæ.*

59. Luzula campestris, vars. campestris and congesta.

19. *Cyperaceæ.*

60. Carex præcox.

20. *Gramineæ.*

61. Anthoxanthum odoratum, 62. Alopecurus pratensis, 63. Phleum pratense, 64. Agrostis vulgaris, 65. Aira cæspitosa, 66. Holcus lanatus, 67. Avena elatior, 68. A. pubescens, 69. A. flavescens, 70. Poa pratensis, 71. P. trivialis, 72. Briza media, 73. Dactylis glomerata, 74. Cynosurus cristatus, 75. Festuca ovina (varieties), 76. F. pratensis, 77. Bromus mollis, 78. Lolium perenne.

21. *Filices.*

79. Ophioglossum vulgatum.

22. *Musci.*

80. Hypnum squarrosum, 81. H. rutabulum, 82. H. hians.

23. *Fungi.**

83. Agaricus arvensis, 84. A. nudus, 85. A. æruginosus, 86. A. geotrupus, 87. A. furfuraceus, 88. Boletus erythropus, 89. Clavaria

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* This list of Fungi is extracted from Dr. Gilbert's paper on the "Fairy-Rings" of the plots in "The Journal of the Linnean Society," vol. xv. The species were determined by Mr. Berkeley.

vermicularis, 90. Hygrophorus coccineus, 91. H. virgineus, 92. H. pratensis, 93. Marasmius oreades.

The complete flora may thus be summarised :—

Total number of species . . .	93	
„ „ „ genera . . .	67	
„ „ „ orders . . .	23	
„ „ „ Dicotyledons . .	54	=93
„ „ „ Monocotyledons .	24	
„ „ „ Acotyledons . .	15	

The foregoing list, it will be seen, includes several species not commonly met with on meadow land, the presence of which may be regarded as accidental. Such, for instance, as *Ranunculus auricomus*, *Vicia Cracca* and *sepium*, *Galium Aparine*, *Sonchus oleraceus*, *Fritillaria Meleagris*, and *Ornithogalum umbellatum*. These, and some twenty other species, are represented only by a few individuals, and, practically speaking, form no appreciable proportion of the crop. On the other hand, many common meadow plants will be missed, as *Lychnis Flos-cuculi* and other species, *Lotus major*, *Silaus pratensis*, and *Senecio Jacobæa*. The elevated situation and good drainage explain the almost total absence of *Cyperaceæ*, and other moisture-loving plants. It has already been mentioned that we have good evidence that the herbage was tolerably uniform all over the plots when the experiments were first started. This is afforded by the present composition of the herbage around the experimental grounds, and more particularly that of the two plots left unmanured from the beginning. These plots are each a quarter of an acre in extent, and, exclusive of the Fungi, about sixty of the remaining eighty-two species enumerated above occur on each plot, and fifty of these were represented in the sample separated into its constituent species in 1872. With the exception of about half-a-dozen rare species they are the same on both plots. Now, if we compare the flora of an unmanured plot with that of 11*a*, a contiguous plot, we find the number of species reduced to eighteen, or less than one-third, whereof sixteen were found in the sample. This plot, it should be mentioned, receives an annual dressing of 300 lbs. sulphate of potass, 100 lbs. sulphate of soda, 100 lbs. sulphate of magnesia, 3½ cwts. superphosphate of lime, and 800 lbs. of ammonia-salts per acre. The effect of this large quantity of manure is to stimulate some of the coarser-growing grasses and other plants to extraordinary growth, and crowd out or otherwise cause to disappear, about forty species, some of which on the unmanured plot hold an equally good or better footing in the struggle for existence. The species found in the sample taken from 11*a* in 1872 are :—*Anthoxanthum odoratum*, *Alopecurus pratensis*, *Agrostis vulgaris*, *Holcus lanatus*, *Avena elatior*, *A. flavescens*, *Poa pratensis*, *P. trivialis*, *Dactylis glomerata*, *Festuca ovina*, *Bromus mollis* (a fragment), *Trifolium repens* (a few leaves only), *Conopodium denudatum*, *Prunella vulgaris* (probably from quite near the margin of the plot, and not really belonging to it), *Rumex Acetosa*, and *Carex præcox* (a leaf or two). But a few figures will give a better idea of the composition of the herbage of this plot, which yields an average spring crop of more than three tons of hay, than a mere list of the species. The figures indicate the per-centage by weight of each species in the total weight of the spring crop. *Alopecurus pratensis*, 12·35; *Agrostis vulgaris*, 13·56; *Holcus lanatus*, 10·33; *Avena elatior* (*Arrhenatherum avenaceum*), 10·41; *Poa pratensis*, 10·40; and *Dactylis glomerata*, 39·28. Altogether, these six grasses formed 96·33 per cent. of the crop of 1872. In their tables Messrs. Lawes and Gilbert give the per-centages of the gramineous, the leguminous, and the herbage of other orders. Those of the plot named for 1872 are respectively 98·84, 0·01, and 1·15. It would occupy too much space here to enter into the many interesting details of these changes; but there is the question how far the various manures exercise an influence on the botanical characters of the plants that calls for a word, and this will be referred to again further on. The grasses that constitute so large a proportion of the herbage on plot 11*a* are also all found on the unmanured plot, but the relative proportions are quite different, and several species which do not occur on the former are generally distributed over the unmanured. Taking a few species in illustration of this fact, we have:—

	Unmanured.	Highly Manured (11*a*)	
Anthoxanthum odoratum	5·20	0·78	per cent.
Briza media	6·40	absent.	
Festuca ovina	21·67	0·38.	,,
Avena pubescens	3·55	absent.	
A. flavescens	3·49	0·09.	,,
Cynosurus cristatus	1·11	absent.	
Avena elatior	0·13	10·41.	,,
Dactylis glomerata	0·90	39·28.	,,
Alopecurus pratensis	0·52	12·35.	,,
Poa pratensis	0·09	10·40.	,,

The general composition of the unmanured herbage is:—Gramina-ceous, 68·66; leguminous, 8·98; other orders, 22·36 per cent.—a kind of herbage very much relished by cattle, but the average crop for eighteen years is only a little over a ton per acre. Between these two extremes, according to the manure applied, the development of different species is very diverse, and some of the facts are not easily explained. A few of the more remarkable cases may be quoted. The quantities of manure are always at the same rate per acre. With 550 lbs. nitrate of soda, 300 lbs. sulphate of potass, 100 lbs. each of the sulphates of soda and magnesia, and 3½ cwts. of superphosphate of lime, *Bromus mollis* and *Poa trivialis* are developed to an extraordinary degree. Sometimes the one preponderates and sometimes the other, the cause of which I have not worked out; but I imagine it is connected with the rainfall and other climatal conditions. In 1872 the *Bromus* formed 42·10 and the *Poa* 24·76 per cent. of the herbage, associated with 3·86 per cent. of *Anthriscus sylvestris* in a total of 5·77 per cent. of "other orders." With 400 lbs. of ammonia-salts and 3½ cwts. of superphosphate of lime, there was 49·29 per cent. of *Festuca ovina*, and 20·59 of *Agrostis vulgaris*, with scarcely any flowering-stems of any plant. On another plot, similarly manured to 11*a*, *Dactylis* formed nearly 55 per cent. of the total produce. A crop singularly rich in the leguminous element is the result of another combination of manures, and in an adjoining plot, to which no sulphate of potass is applied, the contrast is very marked. Thus leguminous plants formed about 40 per cent. of the herbage on the first, and only about 8 per cent. where there was no potass.

Sufficient illustration for the purpose in view has now been given of what Dr. Gilbert terms the "domination of one plant over another." A few remarks on some of the principal plants which do not belong to either the *Leguminosæ* or the *Gramineæ*, must terminate this part of the subject. *Ranunculus acris*, *R. bulbosus*, *Trifolium pratense*, *Lathyrus pratensis*, *Pimpinella Saxifraga*, *Centaurea nigra*, *Achillea Millefolium*, and *Luzula campestris* occur on all the plots except 11*a* and 11*b*, on which the quantity of ammonia-salts applied per acre is 800 lbs. annually; and these plants are all very conspicuous in their flowering season. *Achillea* rarely throws up any flowering-stems before the first crop is cut, and the leaves in the sample, which are comparatively very light, by no means represent the extent to which this plant has possession of the soil. But the leaves alone of this plant form about 10 per cent. of the herbage of one plot. *Conopodium denudatum*, *Heracleum Sphondylium*, and *Rumex Acetosa* occur on all the plots, but the second is in most instances represented by only one or two plants. The *Rumex* is very abundant all over, and constitutes on most plots a large proportion of the miscellaneous herbage, and in rare cases it has almost or quite reached 25 per cent of the total weight of the sample. *Cardamine pratensis*, *Stellaria graminea*, *Chrysanthemum Leucanthemum*, *Senecio erucæfolius*, *Hypochæris radicata*, *Plantago media*, *Primula veris*, *Orchis Morio*, *Scilla nutans*, and several other species which are common in many meadows, are rare here. *Fritillaria* occurs sparingly on one plot, but it is rather plentiful in a not very distant part of the park; and *Ornithogalum umbellatum* is quite rare. *Plantago lanceolata* grows on all the plots except where ammonia-salts are applied, having disappeared from several of these plots since 1862 or 1867.

In conclusion, a few words respecting the analyses or separations of the samples of hay into their constituent species, a labour which at first appears to present insurmountable difficulties, and which no botanist can perform without special training, but with a little practice it is easily accomplished. It is, however, exceedingly trying work for the eyes. Sharp boys, from ten to twelve years of age, learn to distinguish most of the species, even very small fragments of the leaves of any of the grasses, in a fortnight or three weeks; and some of them after a month's teaching perform the operation as well as it is possible to do it. It would occupy much space to describe fully the mode of taking and separating the samples, but it will be understood that the greatest care is exercised throughout, and no time is spared in endeavouring to obtain a fairly representative sample of the herbage of each plot. The characters by which the various species are recognised in the condition of hay were only discovered by degrees, and therefore the first separations were not so well done as the later ones, and a larger proportion was left undetermined. But in 1872 we had the experience gained in former years to aid us in starting, and the amount of undetermined was in the majority of cases less than one per cent. The only really indeterminable parts are the portions of grass culms that are quite destitute of leaves and flowers. Hence great care is necessary after the sample is dry not to break the stems to pieces. Generally speaking, the smallest scrap of a leaf may be identified, as well as the glumes and the grain of the grasses. Of seeds or fruits belonging to any of the other orders very few enter into the samples. The achenes of the *Ranunculi*, seeds of *Cerastium*, mericarps of *Conopodium* and *Anthriscus*, achenes of *Tragopogon*, *Taraxacum*, and *Rumex*, and the seeds of *Luzula* are all easily referred to their proper places, as well as the leaves and stems of all the plants except the grasses. The characters of the leaves of the grasses are various, and are found in their texture, surface, colour, point, ligule, mode of curling or folding together when dry, nature of the margin, colour and relative prominence of the midrib, &c. By one or more of these characters it is possible to distinguish pieces not more than a quarter of an inch long—in fact, almost any piece with two ends. With regard to the influence of the manures on the botanical characters, or any of the characters I have indicated, it appears to be very slight throughout the whole series of experiments. It is mainly limited to the vigour, and consequent size of the plant, and the *degree* of hairiness. That is to say, it is possible to divide the species represented on the plots into those with constantly hairy and those with constantly hairless leaves. The hairs may be exceedingly minute, and only visible in a certain position, as on the upper surface of the folded leaves of *Poa pratensis*, or more or less prominent on both surfaces, as on the hard leaves of *Avena pubescens*, and on the soft leaves of *Holcus lanatus*—the "Hard Hairy" and "Soft Hairy" of the boys. *Avena flavescens*, *Bromus*, and *Anthoxanthum* present different kinds of hairs, difficult to describe but facile to distinguish. Thus it becomes intelligible that, beginning with the less complex samples, and knowing what species grow on the plots whence they were taken, it is not so formidable a task as one might suppose. But it is tedious in the extreme when a handful of small stuff will keep one busy for a day or two.

The object of this brief sketch of the experiments on permanent grass-land at Rothamsted is not so much to make them more widely known as to offer sufficient information to botanists as to render the experiments themselves more intelligible and interesting to those who are obliged to be content with paying an occasional flying visit. Anyone desirous of obtaining more exact details of the plan and extent of the experiments will find what they want in the papers and reports referred to above, and Mr. Lawes has in preparation a full report of the results of these experiments, in which the whole subject will be as exhaustively treated as available data will permit.

A NEW CHINESE *SYMPLOCOS*.

BY H. F. HANCE, PH.D.

SYMPLOCOS (*Hopea*) URCEOLARIS, *sp. nov.;* arborea, ramulis obscure angulatis purpureo-brunneis, innovationibus flavidis, foliis chartaceis glaberrimis elliptico-lanceolatis basi acutis apice in acumen integerrimum glanduloso-mucronatum productis margine leviter revoluto obscure glanduloso-crenato-denticulatis utrinque tenuiter elevato-reticulatis 2-2½ poll. longis 9-11 lin. latis petiolo 3-lineali tenui, racemis axillaribus simplicibus erectis 1-1¾ poll. longis 6-12 floris rachi tomentella floribus breviter pedicellatis superioribus subsessilibus, fructibus 3 lin. longis urceolato-campanulatis glabris lucidis laciniis calycinis ovato-triangulatis acutis longitudinaliter nervulosis inflexis coronatis.

In prov. Cantonensi, secus fl. West River, Maio 1875, fructificantem detexit Rev. J. Lamont. (Herb. propr., n. 19309.)

A proxime affini *S. læta,* Thw.! foliorum constantia, baccarum calycisque loborum forma distincta. *S. myrtacea,* S. & Z.! discedit foliis coriaceis, crenis magis conspicuis acumineque subito falcato præditis, venarumque rete haud manifesto, racemis paucifloris corymbosis, fructibusque ellipticis.

The handsome *S. ferruginea,* Roxb., of which the still handsomer *S. coronata,* Thw.! is a near ally, was gathered by me in November, 1866, on the southern coast of Kwang tung.

I am glad to be able to state that all doubt as to the extremely beautiful *S. decora,* described by me two years since,* being a native of Hongkong has been dispelled, Mr. Ford having himself, on the 4th of March, 1876, met with two shrubs of it, one four feet high, on the north-east side of Victoria Peak, about 100 yards below the signal gun.

ON TWO *DIPTEROCARPACEÆ.*

BY H. F. HANCE, PH.D.

DRYOBALANOPS SCHEFFERI, *sp. nov.*—Ramulis ultimis petiolisque tomento stellato brevi ferrugineo obsitis, foliis rigide chartaceis basi cuneatis apice breviter obtuse acuminatis 2¾-6 poll. longis 14-24 lin. latis petiolo 3-4 lineali utrinque lucidulis et glaberrimis costa subtus prominente costulisque mediocribus ad utrumque latus 10-14 arcuato-curvatis in marginem abeuntibus venularum rete subtili, floribus ad basin ramulorum in racemos breves 3-4 floros dispositis, calycis fructiferi tubo longitudinaliter striato-sulcato imam capsulæ basin tantum cingente laciniis auctis basi revolutis deorsumque gibbose productis tubum calycinum abscondentibus sursum subconniventibus lineari-oblongis obtusissimis coriaceis flavidis vernicosis trinerviis

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* Trimen, Journ. Bot., 1874, 369.

nervis tantum luci obversis perspiciendis paulo inæqualibus 1½-1¾ poll. longis 4-5 lin. latis, capsula 5-6 lin. longa dense et minute stellato-glandulosa, stylo basi paulo incrassato stigmate cupulato trilobo.

In ins. Sumatra. Specimina misit am. Dr. R. H. C. C. Scheffer, horti Bogoriensis dignissimus Director, cui sacratam volui.

This curious plant, of which I have unfortunately seen no flowers, has a twice shorter fructiferous calyx-tube than *D. Beccarii*, Dyer, as represented in his figure,* but its shortness is exaggerated by its being thoroughly hidden by the downward production of the backward folded bases of the lobes. In the stigma it recedes from the generic character, but I really do not know where it is to be placed, unless here. Possibly it may be the type of a distinct genus. I have seen the foliage only of four or five supposed species of *Dryobalanops* from the Malayan Archipelago, which are cultivated in the Buitenzorg Gardens, and there can be no doubt that enormous establishment possesses an extraordinary amount of unedited species.

I take advantage of the occasion to note, from specimens communicated by Dr. Scheffer, found in the province of Lampong, Southern Sumatra, the characters of the fruit of *Hopea mengarawan*, Miq., of which the flowering plant has alone been described hitherto.†

Calycis fructiferi lobis glaberrimis vernicosis oblongo-obovatis obtusis tenuiter membranaceis 9-nerviis 22 lin. longis 5-6 lin. latis basi nucem amplectante tumidis.

This species is very closely allied indeed to the Cambodian plant I lately referred in this Journal (with a diagnosis) to *H. micrantha*, Hook. fil., but it differs by its lepidote branchlets, larger leaves more widened towards the base, the midrib prominent above as well as beneath, and the longer fruit-wings; and as in these very points it agrees better with Hooker and Dyer's descriptions than does the plant of Pierre, I can scarcely doubt that the Bornean and Sumatra trees are identical. I therefore desire to substitute the name of *H. Pierrei* for that I had conjecturally given. Hooker's paper‡ was read in June, 1860, and Miquel's Prodromus of the Sumatran Flora published in the same year, so that there is a question as to precedence. But if Hasskarl's *Petalandra* really falls into *Hopea*, as maintained in the "Genera," though doubted by A. De Candolle (and I have only fruiting specimens myself, which are insufficient to settle the question), then the specific name *micrantha* would remain with it. Both belong to a small group, distinguished under the sectional name of *Dryobalanoides* by Miquel, yielding resin, and differing by a peculiar habit and ecostulate finely-veined leaves from the majority of *Hopeæ*.

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* Trimen, Journ. Bot., 1874, t. 142, f. 7.

† Miq. Prodr. Fl. Sumatr., 491.

‡ Trans. Linn. Soc. xxiii., 161.

SHORT NOTES.

Jersey Plants.—*Isnardia palustris*, L. Is this plant still to be found in any of the old recorded English habitats? I have searched the stations at Petersfield Heath and Buxted for it without success, and understand it is no longer to be found at Brockenhurst. This summer, too, I could not see any traces of it in St. Peter's Marsh, Jersey, which was unfortunately drained about seven years ago, causing the complete extinction of several rare plants, including *Ranunculus ophioglossifolius*, Vill. I hear that *Isnardia* has been observed in one other station in Jersey, near St. Clement's, but has not been found there this year.—*Gnaphalium luteo-album*, L. This plant would appear to have become almost extinct in Jersey; as Dr. Bull informs me, of late years nearly all the specimens obtained there have come from gardens in or near the town, where they appear spontaneously as weeds. I found on July 27th a small patch growing in sandy ground that was evidently inundated in winter, close by the first Martello Tower in St. Brelade's Bay, far from any cultivation. Few specimens exceeded an inch and a half in height, and required some searching for, as a profuse growth of *Salix repens* covered the ground, and almost hid the *Gnaphalium*.—J. Cosmo Melvill.

Solanum Dulcamara with yellow berries.—Dr. Masters has sent from Ealing a fresh specimen, collected by him in September, of a singular variety of *Solanum Dulcamara*, L., with pale yellow fruit. This form, which has hairy leaves with large auricles, does not appear to be noticed in the books.

Anthoxanthum Puelii.—I enclose a specimen of a grass which I believe to be *Anthoxanthum Puelii*, Lec. et Lam., which I collected on the 26th August last. It grew freely on peaty ground near the south-eastern extremity of Lindow Common, Hundred of Macclesfield, Cheshire, the rifle-range being about a quarter of a mile north-west. From the appearance of the ground I am of opinion that originally it formed part of the adjacent waste bog, but has been reclaimed at some distant date. It is crossed by a cart-track, apparently used for conveying turf from the moss. Most of the ground in question is covered with grass and weeds, but there are some patches of potatoes. Extending over a length of twenty to thirty yards, amongst grass and common weeds (no introduced plants), the *Anthoxanthum Puelii* grew in fair quantity, with all the appearance of being native. It is, however, possible that it may have been introduced with grass seed, although, from the look of the surroundings, this hardly seems likely, as the grass grows in patches as if self-sown.—Robert Brown, *Liverpool*.—[Mr. Brown's discovery is of considerable interest, as bearing on the question of the nativity of his Grass. The Mobberley station where Mr. Britten collected the plant (see Journ. Bot., 1874, p. 278) is about three miles only from the above locality. There was some doubt as to the plant being native at Mobberley, the place having been sown some years previously with grass seed; and Mr. Briggs, in his note (Journ. Bot., 1875, p. 297) on the plant near Plymouth, thinks it not unlikely to have been unintentionally introduced there. It appears to be strictly annual, but even if originally introduced here will probably establish itself in suitable localities.—*Ed. Journ. Bot.*]

RUMEX CONGLOMERATUS, *var.* BORRERI. — At p. 3 of this volume notice is taken of a trigranulate Dock from Sussex, confounded with *R. rupestris* in this country, and having characters somewhat intermediate between *R. conglomeratus* and *R. nemorosus.* It is also there suggested that it was probably this plant which Borrer sent to Sowerby from Sussex, and which was figured in "English Botany," t. 1533, under the name of *R. sanguineus,* as stated in a previous note in the volume for 1875, p. 337 (there printed *acutus* by an error). The examination of a very extensive series of oxylapathoid Docks, made this year in Sussex by Mr. Warren, seems to fully confirm this view. Among them is a specimen collected at Burgess Hill, intermediate between *nemorosus* and *conglomeratus,* having the erect habit and leafless whorls of the former, and the narrow leaves and three well-marked tubercles of the latter, with which on the whole I am inclined to put it, though it might almost as well come under *nemorosus.* It is quite distinct from *R. rupestris,* and, indeed, is remarkable for its small fruit, as contrasted with the very large fruit of the western species. The fruit is well-developed, and the plant has none of the appearance of a hybrid. The old "E.B." figure fairly represents a young branch, and the form may take the name of var. *Borreri,* after its discoverer. Mr. Warren's large collection further showed that *R. nemorosus* does occasionally develope a smaller second, or even a still smaller third tubercle; such unequally trigranulate perianths may be not unfrequently found by searching for them. It is not improbable that some of these puzzling plants are hybrids between the two closely-allied species, *R. conglomeratus* and *R. nemorosus.* A good figure of typical British *R. nemorosus,* with accurate details, is still a desideratum.—HENRY TRIMEN.

Extracts and Abstracts.

ON ACNIDA.

BY ASA GRAY.

THE true *Acnidæ* are submaritime, and have a pretty large and indehiscent utricle, which is somewhat fleshy when fresh. Our botanists on the whole have failed to make out more than one species.

Moquin-Tandon, in De Candolle's Prodromus, in 1849, added a section, *Montelia,* with a more membranaceous, utriculate, and smaller fruit, under which he placed two species, *A. tuberculata,* a new one, and *A. rusocarpa,* which he took for Michaux's of that name; but the plant he describes is not the one figured in Michaux's Flora, and

I suppose is not distinct from Moquin's own *A. tuberculata.* This belongs mainly to the banks of rivers and lakes.

When I published the second edition of my "Manual of the Botany of the Northern United States," I had in cultivation, from Fendler's seeds, the *Amarantus tamariscinus* of Nuttall, which I saw had the characters of *Acnida*, sect. *Montelia* of Moquin-Tandon, except that the utricle was circumscissile in the manner of a true *Amarantus.* Whereupon, having adopted *Euxolus*, I followed up Moquin's hint, and set up *Montelia* as a genus, upon what I took to be one polymorphous species; having, by a sad oversight, confounded Moquin's *Montelia*, which has a small and indehiscent utricle, with my *M. tamariscina*, the utricle of which dehisces transversely, and which likewise has far more slender fertile inflorescence.

While correcting this gross mistake, I wish also to direct the attention of our botanists this summer to the coast species of *Acnida*, and to request that specimens be prepared, and also critically examined when fresh, with the view of soon determining whether I am justified in my belief that we have three genuine species on the Atlantic coast, or within reach of tidal water. If my present opinion is well founded as to the species, and as to the extent of the genus, the arrangement should be somewhat as follows: —

ACNIDA (*Acnide*, Mitchell), Linn.

(1.) EUACNIDE.—Utricle somewhat fleshy, indehiscent, large, *i.e.* one and a half to two lines long.

A. rhyssocarpa, alias *rusocarpa*, Michx.—Fertile inflorescence very naked; the bracts not half the length of the fleshy utricle, the angles of which are not rarely rugose-tuberculated; stigmas comparatively short and slender-subulate. Salt marshes, New England to Georgia.

A. cannabina, L.—Fertile inflorescence slender or sometimes glomerate; utricle thinner and smaller, with acute and smooth angles, much exceeding the bracts; stigmas very long and filiform, almost plumosely hairy. Salt marshes and river-banks, even beyond brackish water, New England to Georgia, West Indies (?), etc.

A. australis, n.sp. (*A. cannabina*, Chapman, S. Flora).—Panicled spikes of the fertile inflorescence dense, linear-cylindrical; utricle smooth, thin, hardly at all fleshy, acute-angled, little if at all exceeding the imbricated bracts; stigmas setaceous, rather short Florida, at Apalachicola, Dr. Chapman; Biscayan Bay, Dr. Palmer, coll. no. 462.

(2.) MONTELIA, Moquin-Tandon.—Utricle thin and small (half to two-thirds of a line long), punctate-rugose or roughish indehiscent, equalled or exceeded by the cuspidate-tipped bracts; stigma slender, filiform, almost plumosely hairy.

A. tuberculata, Moquin-Tandon, in DC. Prodr. *A. rusocarpa*, Moquin-Tandon, l.c., not of Michx. *A. cannabina*, var. *concatenata*, Moquin-Tandon, l.c. *Amarantus Miamensis*, Riddell, Synopsis. *Montelia tamariscina*, Gray, Man. Bot. ed. 2, 370, and ed. 5, 413, partly, especially the var. *concatenata.* River-banks, shores, &c., in the interior. Lake Champlain to Iowa and Texas. Sometimes erect, and from one to four feet high, sometimes spreading or prostrate in sandy or gravelly soil.

(3.) Pyxidi-Montelia.—Utricle thin and small, shorter than the cuspidate-tipped bracts, circumscissile in the manner of true *Amarantus;* fertile inflorescence in slender virgate paniculate spikes, less glomerate than in the preceding; stigmas similar or shorter.

A. tamariscina.—*Amarantus tamariscinus*, Nutt., in Trans. Am. Phil. Soc., n. ser., v. 165. *Montelia tamariscinus*, Gray, l.c., in part. Arkansas to Texas and New Mexico.

Our botanists along and near the seaboard are particularly requested to examine the species they meet with, and to send good fruiting specimens to the writer. The distinctions between *A. cannabina* and *A. rhyssocarpa* should be especially looked after. The fruit of the former is hardly to be found in any of our larger herbaria. Florida specimens of any *Acnida* are much desired. So also are fertile specimens of any from Arkansas and Texas, especially of *A. tamariscina.* Nuttall's specimens of this are not even in flower, so that he was unaware that the plant was diœcious and the fertile flowers achlamydeous. Although the plant is common in Texas, ripe fruit is little known.—*From the "American Naturalist," August*, 1876.

Sur le développement du fruit des Coprins et la pretendue sexualité des Basidiomycetes; Sur le développement du fruit des Chætomium et la pretendue sexualité des Ascomycetes. Par M. Ph. Van Tieghem. (Annales des Sciences Naturalles, vi^{e} série, tome 2).—Hitherto, ever since the publication of Prof. de Bary's views, the sexuality of the higher Fungi has been admitted without question, and some first experiments undertaken by M. Van Tieghem and briefly recorded by him seemed to bear out those views, which received further support from results obtained by Rees, Kirchner, and Eidam. In *Coprinus* some of the mycelial filaments bear bundles of rod-like bodies, which became disarticulated and resisted germination. On other filaments were produced vesicular expansions, generally terminated by a short papilla, which died if left to themselves; but the rods, if applied to them, appeared to become anastomosed and to enter their contents into the vesicles, which then continued with, developing into *basidiosporous* fruits. These facts seemed to indicate the existence of sexuality, the rods being the male element (*pollinodia*), the vesicles the female element (*carpogonia*). However, on further examination, it was found that the rods have the faculty of germinating; that they are, in fact, *conidia*—mere elements of vegetative reproduction; and similar results were obtained in the case of *Chætomium* and *Sordaria*, the two Ascomycetous genera examined, whose supposed *pollinodia* are held by M. Van Tieghem to be merely the commencement of the wall investing the non-sexually produced *ascogonium*. This function is made manifest in a very beautiful manner in cases where the *ascogonium*, still uncovered, comes in contact with a mycelial thread, when growth is completely arrested. Prof. de Bary will have no easy task in refuting these views; one point in his favour is the undoubted circumstance of sexual reproduction holding in some of the lower Fungi, *e.g.*, Mucorini and Peronospora. With these facts before one, it is difficult to believe that the higher groups can be totally devoid of a sexual apparatus.

Use of the hygrometric twisting of the tails of the carpels of Erodium.—Prof. Gray gives (Amer. Journ. Sc. and Arts, Feb., 1876) a short account of the function of the long twisted style of *Erodium* and the awn of *Stipa.* He comes to the same conclusion as Roux, and more recently Mr. F. Darwin, viz., that the twisted portion by its movements buries the carpel in the earth. Roux has observed that when the carpel of *Erodium* has thus been planted, the beak is soon detached by the surrounding moisture.

A new genus of Convolvulaceæ from Somali Land.

HILDEBRANDTIA, *Vatke.*—Sepala 4 decussatim imbricata inæqualia, exteriora paulo majora post anthesin in alas orbiculares in pedunculum late decurrentes valvatim adpressas et fructum medio includentes accrescentia. Corolla tubo infundibuliformi, limbo quadripartito. Stamina 4 longitudine inæqualia tubo inserta demum exserta. Ovarium biloculare, loculis exterioribus oppositis biovulatis. Styli duo distincti; stigmata lobata. Capsula bilocularis, loculis ovulo altero abortivo plerumque monospermis.

Genus *Cressæ* et *Sedderæ* proximum, hibitu singulari, florum tetramaria et sepalarum mirifica indole distinctissimum. Species unica (*H. africana,* Vatke) Africæ orientalis incola.

Frutex aridus microphyllus, ramis spinescentibus, ramulis abbreviatis folia fasciculata et flores axillares gerentibus. Pedunculi fructiferi elongati filiformes. Calyx fructiferus *Pteleæ* samaram æmulans. Pili foliorum unicellularis medio affixi, crure altero apicem, altero basin folii spectante. (Sitz. der ges. Aaturfor. Freunde zu Berlin, 18th Jan., 1876: reported in "Botanische Zeitung," 2nd June, 1876.)

[J. M. Hildebrandt, no. 1515.—Somali Land, base of hills, not common, April, 1875.—Vernac: *Kabba assá.* Leather is dyed red with the juice of the root.]

Reduction of Nitrates to Nitrites by Bacteria. (MENSEL in Ber. Berl. Chem. Ges., Oct., 1875. Abstract in Amer. Journ. Sc. and Arts, Jan., 1876.).—In support of this view the following facts may be cited:—Water containing Bacteria and nitrates, but neither ammonia nor nitrites, gives reactions of nitrous acid after standing four days, while antiseptics either completely or partially prevent the production of the nitrous acid.

If freshly-distilled water be boiled with glucose and potassic nitrate, it does not exhibit the presence of nitrites, even after long standing, because Bacteria are absent.

Putrefying (*i.e.*, Bacteria-containing) albuminoids reduce nitrates to nitrites.

Heteromorphism in Epigæa. By ASA GRAY. (Amer. Journ. Sc. and Arts, July, 1876.)—Flowers of *Epigæa* present four modifications of andrœcium and gynœcium.

1. About ten per cent. have glutinous stigmas, borne on styles long enough to project a little beyond the throat of the corolla; the anthers are slender and included; they soon wither away, and contain few pollen-grains.

2. A few plants have stigmas as in 1, but the styles are included; the anthers also are in the same state as in 1, though sometimes rudimentary or altogether absent.

3. Three-fourths of all specimens examined have long styles, but smooth and almost dry stigmas; in this form the anthers abound in pollen.

4. A few have the dry stigmas of 3, but short styles.

These facts are held to show that dimorphism had at first been attempted, but that the andrœcium did not exhibit sufficient plasticity of modification, so that the tendency is now towards diœcism, the less economical method of ensuring cross-fertilisation.

Notices of Books.

Mathias de l'Obel: sa Vie et ses Œuvres, 1538-1616. Par M. Edouard Morren. Liege. 1875. (pp. 25.)

We have here another of those carefully-written biographies of Belgian botanists which M. E. Morren has from time to time brought out. As in reviewing the corresponding memoir of Charles de l'Escluse in these columns, (Journ. Bot. n.s., iv., p. 347) we alluded to the interest attaching to the visit to this country of the subject of the biography, so in this case even greater interest arises from the fact that Lobel not only passed many years of his life on these shores, but ended his days within a short journey of the metropolis.

For the most part, those who have attempted to tell the life-history of our early botanographers have contented themselves with the bare statements derived from perusal of the works of their respective authors, without giving the needful references. These omissions greatly add to the labour of subsequent biographers, who feel it incumbent upon them to test the truth of each individual statement. Even in this little brochure the reader will frequently regret the want of citations. Take, for instance, this passage: " . . . De l'Obel avait beaucoup herborisé en Angleterre, et l'on rapporte même que sa femme l'aidait à collectionner des plantes" (p. 8). We are not ourselves aware from whence this rather vague assertion takes its rise; on the contrary, we are sorry that our author has not solved the question for us, but has suffered it to remain unproved.

Excepting on this point, we can accord a full measure of approbation to the work before us as being the fullest account of Lobel that has appeared, or is likely to appear, unless some unexpectedly rich vein of information should hereafter be opened up. In the dispute between Parkinson and William How, M. Morren not unnaturally sides with the latter, although we cannot approve of the far from gentle language used by How towards Parkinson, who seems to have fairly acquired the use of Lobel's materials by purchase.

There is one droll misprint which we must notice. On page 21 Lobel is said to have observed certain plants "en Danemarck et aux environs de *Newgate;*" of course Highgate is intended. The modern style of bedding-out has familiarised (in the well-known blue *Lobelia*) the name of Lobel to many; both to these, and others who have a more extended knowledge of Botanical History, we heartily commend this pamphlet. B. D. J.

Science Papers; chiefly Pharmacological and Botanical. By DANIEL HANBURY, F.R.S. Edited, with a memoir, by JOSEPH INCE. London: Macmillan and Co., 1876 (8vo, pp. 544).

THIS volume contains reprints of the various papers contributed by the late D. Hanbury to the "Pharmaceutical Journal," the "Transactions and Journal of the Linnean Society," and a few other periodicals; they are eighty-one in number, and were published during the quarter-century 1850—1875. A memoir of forty pages is prefaced, and the book is adorned by an admirable portrait, whilst a very copious index of twenty-seven pages concludes the volume.

We have so lately (J. Bot., 1875, p. 52) noticed fully the great work which Hanbury, so fortunately for science, lived to complete, and on which his reputation will principally and most securely rest, that there is little to be said on the subject-matter of these papers. It is chiefly as exhibiting the author's mode of work, and the singular accuracy and almost painful care with which he compiled them, that their republication is now of value; the great bulk of them being preliminaries of the articles in the "Pharmacographia," and the results embodied in that admirable treatise. Very few men of science have been able to restrict themselves so completely to a limited field of research as Hanbury, and still fewer to persevere so pertinaciously in the discovery and attainment of accurate information and definite settlement of long-disputed points. The secret of his success, as his biographer tells us in his rather incoherent and fragmentary memoir, was his power of perseverance. "Having set before him one definite line of action, he pursued it to the unwavering exclusion of other influences, and neither the charms of scenery nor historic associations [in his travels], still less the voice of pleasure, could tempt him from his course." "He has left behind him a voluminous correspondence absolutely devoted to scientific subjects and unrelieved by a solitary domestic detail."

The volume is, indeed, a very perfect memorial of the author, and reflects his truthful character on every page. The most important papers are the "Notes on Chinese *Materia Medica,*" and those on "Storax," on "Gamboge," and on "Manna," all of which are models of this kind of research, and form a standard with which few memoirs will bear comparison.

The papers are arranged in no intelligible order—a combination of systematic and chronological apparently. The source of each should have been placed at its head instead of being relegated to a table, difficult to find, near the end of the book. The index, too, is unnecessarily spread out with useless references and repetitions, and contains numerous misprints. H. T.

A Catalogue of Plants cultivated in the Garden of John Gerard, in the years 1596-1599. Edited, with Notes, References to "Gerard's Herball," the addition of Modern Names, and a Life of the Author, by BENJAMIN DAYDON JACKSON, F.L.S. Privately printed. London. 1876. (4to., pp. 64.)

A REPRINT of so scarce a little tract as the first edition of Gerard's garden catalogue, of which the copy in the British Museum is the only one known to the author, is very acceptable. Its title is "Catalogus arborum, fruticum ac plantarum tam indigenarum, quam exoticarum in horto Johannis Gerardi, civis et chirurgi Londinensis nascentium," and the date 1596. Though carelessly prepared and very badly printed, it possesses a special interest as the earliest complete list of the plants cultivated in an English garden, or indeed in any garden known. It is dedicated to Lord Burleigh, of whose gardens in the Strand and at Theobalds in Hertfordshire at the time Gerard was superintendent. The precise site of his own "hortulus suburbanus" cannot now be fixed with certainty, but was probably in Holborn, where he had a house; but, as Mr. Jackson points out, the northern side of the road was at that time a garden of forty acres belonging to the Bishopric of Ely.

The reprint of this catalogue aims to be an exact copy, but does not attempt an actual facsimile. The names, which are in Latin, are arranged alphabetically and printed in two columns, and are about 1027 in number. In the following year, 1597, Gerard published the book by which he is well known, his "Herball," which, as improved by Johnson, was for so long the standard botanical work in this country; and two years after, in 1599, the second edition of the "Catalogus" of his garden appeared. Of this several copies are known. It is a small folio of twenty-six pages, with a dedication to Sir Walter Raleigh, and contains many more plants than the previous one, arranged alphabetically in two columns by their Latin names, to which, however, the English ones are added.

It is in the reprint of this that Mr. Jackson has embodied his own researches, with the result of giving us a very interesting volume. His object was primarily to determine Gerard's plants, a matter often of considerable difficulty. "The vagueness noticeable in Gerard's works has proved a constant source of annoyance and possible error in the task of determination. . . . . It has frequently been necessary, from the total incompatibility of the English and Latin names, to judge by probabilities which denomination to follow." Without the aid of the old collections embodied in the Sloanean herbarium several could never have been made out; as the editor remarks, "the possession of these contributes to render the British Museum unrivalled for such researches." He has added to each species in the list a reference to the "Herball" of 1597, and then appended in thick type the modern scientific name. Occasionally extracts from the "Herball" and other books bearing on the subject are given, and, in fact, we have here all the information on the plants of this early garden that can be brought together. A full index to the modern names concludes the volume, and forms the readiest means of ascertaining the whole contents of the garden. These modern species amount to 855, and comprehend a remarkable assemblage of plants, certainly as a whole very different, both in what it contains and in what it is deficient, from that which any garden at the present day would exhibit. To a basis of old-fashioned perennials, favourites here long before Gerard's time—*Iris*, *Anemone*, *Lychnis*, *Lupinus* and the like—bulbs like *Narcissus* and long-cultivated shrubs like the Roses, he had added a large collection of rare British plants (such as *Actæa spicata*, *Goodyera repens* and many other Orchids), many S. European and Mediterranean annuals grown from seeds sent home by his numerous correspondents, and plants of special interest and novelty derived from cultivators and gardens abroad, especially from Robin, keeper of the royal garden at Paris, and Lord Edward Zouch at Constantinople. Amongst those from the former was *Datura Metel*, whilst *D. Stramonium* was introduced by the latter. Potatoes and Tobacco were both in the garden; the former is catalogued as "*Papus orbicularis*, Bastard Potatoes" (to distinguish it from "*Papus Hispanorum*, Spanish Potatoes," which is *Batatus edulis*), the latter as "*Tabaco*, Indian Tobacco, or Henbane of Peru." Attention has previously been called in this Journal (1871, p. 163) to *Acorus Calamus* as having not improbably originated in this country from Gerard's garden, where it may have been received from Robin, who grew it at Paris.

It is not possible to go into any further details, and the purely horticultural aspect of the volume is beyond the province of these pages. We have only to express the thanks of botanists to the editor, who has spared neither time, trouble, nor expense in his work, and has the satisfaction of distributing a very complete and accurate book, and an elegant memorial of a man of note in the history of British gardening and botany. H. T.

Compositæ Indicæ descriptæ et secus Genera Benthamii ordinatæ; a C. B. CLARKE. Calcutta. 1876.

THIS is a laborious work of over 350 pages, consisting of a complete descriptive monograph of the Compositæ of Peninsular India. It would, of course, be out of the question to attempt criticism of the mass of detail here presented, which, indeed, appears to have been arranged with great care, resulting in a solid addition to the knowledge of Indian botany. An appendix gives in a clear tabular form the geographical distribution of each species through the nine divisions into which India has been divided for the purpose. From this it appears that the North, West, and Central Himalaya are the richest areas in plants of this Order, and that the poorest is the Gangetic plain. This latter district has "for a moist tropical region a poverty-stricken flora. Dr. T. Anderson considered that in all *alluvial* Bengal, a very enormous square mileage, not 600 Phænogams were to found, and of these a large number doubtfully indigenous. This poverty, greater by far than that of a single English county, appears less remarkable when we recollect that it results because we confine our attention to one particular kind of soil." Some comparisons with Mr. Bentham's elaborate tables of distribution conclude the volume, which must prove of great assistance to Indian botanists, who are under great obligations to the energy and public spirit of the author.

A note bearing on a British species occurs at p. 99, where a *Filago* from the Punjab and North-west India is described under the name of *F. arvensis*, L., and it is stated that the Indian specimens quite agree with specimens from Esher, Surrey, collected and labelled by H. C. Watson "*Filago lutescens*, Jordan (*F. apiculata*, G. E. Sm.)." One cannot but suspect an error here, as *F. arvensis*, though a common North European plant, has not occurred in England.

H. T.

Botanical News.

Articles in Journals.—August.

Hedwigia.—E. C. Hansen, "*Peziza ripensis*, n. sp."—N. Sorokin, "On *Helminthosporium fragile*, n. sp." (with fig.).—C. Kalchbrenner, "Two new genera of Fungi" (*Kalchbrennera* and *Macowanites*; see p. 248).

Flora.—J. E. Weiss, "On the vascular bundles of the *Piperaceæ*" (contd.).—F. de Thuemen, "Fungi austro-africani."—W. Nylander, "Note on *Pyrenocarpei* collected in Cuba by C. Wright."—Christ, "Forms of *Rosa*."—A. Geheeb, "Bryological notes"—A. de Krempelhuber, "Lichenes Brasilienses" (contd.).

Bot. Zeitung.—Solms-Laubach, "Development of the flowers of *Brugmansia Zippelii*, Bl., and *Aristolochia Clematitis*" (contd.).—A. W. Eichler's "Answer to E. Reuther's Reseaches on development of flowers."—Schenck, "On the receptacle in fossil *Equisetaceæ*" (Annularia).—A. Famintzin, "On the formation of the seed-leaves in plants."—H. Hoffmann, "Experiments in cultivation" (tab. 9).

Œsterr. Bot. Zeitschr.—G. Haberlandt, "On the influence of frost on chlorophyll corpuscles."—P. Ascherson, "*Dianthus Jaczonis* (*deltoides* × *superbus*)."—A Kerner, "Hungarian plants" (contd.). —J. Freyn. "On Austro-Hungarian plants" (contd.).—F. Hauck, "Algæ of Gulf of Trieste; Suppt."—C. Eder, "Researches on separation of watery vapour by plants" (contd.).—F. Antoine, "Botany at the Vienna Exhibition" (contd.).

Bull. Bot. Soc. France (tom. xxiii., pt. 2).—A. Magnin, "Mosses and Lichens of the upper part of Vallée d'Ubaye, Basses Alpes."—P. van Tieghem, "On the physiological *rôle* and determining cause of the curving of the fructiferous shoots in *Absidia*."—P. Duchartre, Decaisne, Bureau, Jourdain, Chatin, Barral, Hardy, "*Eloges* on Brongniart."—List of Brongniart's works.—H. A. Weddell, "Monograph of the species of *Amphiloma* of the French flora."—P. van Tieghem, "New observations on the development of the fruit and the pretended sexuality of *Basidiomycetes* and *Ascomycetes*."—D. Clos, "Reciprocal affinity in *Rosa* and *Rubus*."—E. Roze, "Catalogue of *Agaricini* observed in the environs of Paris."—Boudier, "On the probable parasitism of some species of *Elaphomyces* and on search for them." —M. Cornu, "Where to look for the reproductive organs in *Uredineæ* and *Ustilagineæ*."—G. de Saporta, "On the fossil plants of the *tufs* of

Meximieux." — Duval-Jouve, "On certain so-called insectivorous plants" (*Aldrovanda*, *Utricularia*).—Lefèvre, "On *Rubus plicatus*, W. et N."—Cauvet, "On the direction of roots."—L. Quélet, "Classification and nomenclature of *Hymenomycetes*." — Bertot, "Method of nature printing."—Ripart, "On some new or rare species of Cryptogams of Central France."

Annales de Sc. Nat. (sér. 6, tom. iii.).—B. Renault, "Fructification of some fossil plants of Autun and S. Etienne" (tab. 1—4).—N. Sorokine, "Development of *Scleroderma verrucosum*." —Id., "*Bursulia crystallina*, gen. nov. Myxomycetum" (t. 8).—Id., "Development of *Aphanomyces stellatus*" (t. 7).—M. Cornu, "Reproduction of *Ascomycetes*" (tab. 9—11).—E. Prillieux, "On the formation and development of some galls."

New Books.—E. Cosson et German de St. Pierre, "Synopsis analytique de la Flore des environs de Paris," ed. 3. (5s.).—J. G. Agardh, "Species Genera et Ordines Algarum," vol. iii. (Leipzig. 20s.).—H. Baillon, "Dictionaire de Botanique," part 1st. (Paris. 5fr.).—J. Lloyd, "Flore de l'Ouest de la France," ed. 3. (Nantes.)—C. B. Clarke, "Compositæ Indicæ." (Calcutta. 1 rupee 8 annas).—W. H. Brewer, S. Watson, and A. Gray, "Botany of California," vol. 1. Polypetalæ and Gamopetalæ. (Cambridge, Mass. 4to. 6 dols.).—T. de Heldreich, "Sertulum plant. nov. vel minus cognit. floræ Hellenicæ." (Florence.)

Prof. Reichenbach is still carrying on the "Icones Floræ Germanicæ," but the parts now appear at very long intervals indeed. The 15th and 16th decades of vol. 22nd have lately been published, continuing the *Leguminosæ*. It is much to be desired that this great work on the flora of Europe could progress more rapidly towards completion, especially as there are now only a few Orders remaining to be treated.

A second part of Mr. Fitzgerald's fine work on Australian Orchids (the first part of which is noticed on p. 249) has been issued.

The Zoologico-botanical Society of Vienna has printed a "Festschrift," or commemorative volume of its 25th anniversary. It contains valuable memoirs by Wiesner, on Chlorophyll; Vogl, on the false Bark of pharmacissts; Peyritsch, on the teratology of the ovule; Reichardt, on the Fungi described by Clusius in his "History of Pannonic plants"; and Kerner, on the protective adaptations of flowers against unwelcome visitors.

Dr. G. Stenzel has published an important memoir in the "Nova Acta" (bd. xxxviii., n. 3) on the morphology of the scales of the *Coniferæ* (with 4 plates), which we hope to notice more fully.

Dr. Richard Schomburgk has printed some interesting "Botanical Reminiscences of British Guiana," being recollections of the boundary expedition under the command of his brother, Sir Robert Schomburgk, which he accompanied. The account is pleasantly written, and conveys a good deal of information on the character of the vegetation of this rich country, still most imperfectly known.

The "Alpine Journal" for February and August last contains a paper by Mr. C. Packe on Alpine Saxifrages. Few botanists have been more successful in detecting species in their native places than the author, who is thus well fitted to speak of the results of his alpine climbing.

In the "Preliminary Report on the Forest and other Vegetation of Pegu," by Mr. Kurz, recently published at Calcutta, will be found a large amount of information on the vegetation of that little-known country, though the author has not professed to give a botanical account of it. A short account of the geography, geology, and climate of Pegu is first given, and then a botanical description, with a table of the natural Families, and an estimate of the number of species. Naturally the forests receive most attention, and we have a full list of Burmese trees, with the native names, and remarks on the distribution and uses of each, and a key for their determination. In the appendix is given a description of a new genus from Martaban, *Mayodendron* (=*Spathodea ignea*, Kurz olim), dedicated to the memory of Lord Mayo, illustrated by 2 plates.

A new account of the geology, physical geography, and botany of the West Riding, under the title of "West Yorkshire," is advertised "in preparation." The authors are J. W. Davis and F. A. Lees, the latter being responsible for the Flora proper. The price is fixed at one guinea.

The fourth edition of Prof. Morren's "Correspondance Botanique," lately issued, is more full and more accurate than previous ones, the list occupying eighty pages. It is a very useful publication.

A Botanical Exchange Club has been founded at Budapest, under the management of M. Richter-Lajo. He offers especially the plants of Hungary, Transilvania, Croatia, and neighbouring territories, and is anxious to obtain correspondents in other parts of Europe. The subscription is 2 fl. (4 shillings), and all information can be obtained from M. Richter-Lago, Erzherzogin Marie Valerie Gasse, No. 1, Budapest, Hungary.

Christian Gottfried Ehrenberg died at Berlin on the 27th of June, at the great age of eighty-two, having been born at Delitzsch on the 19th of April, 1795. His first publication, in 1818, was on Berlin Fungi, and for nearly sixty years from that date he has followed biological investigations of various kinds. In the year 1820-25 he travelled in Egypt, Nubia, Abyssinia, and Arabia for the purpose of investigating the natural history of those countries; on this journey he was accompanied by Hemprich, who, however, died in Abyssinia. Some of the results of this journey were published in the "Symbolæ Physicæ" (1828), a fine folio book with coloured plates, which is, however, unfinished—2 parts only of the botany were issued; and in several papers on special points. Ehrenberg about this time also made a tour in Siberia. It is, however, by his valuable labours among the lower organisms that he will always occupy a prominent rank among naturalists. His papers upon this branch of science are very numerous and important, and he extended his microscopical observation to fossil organisms, thus opening up a new and fertile field of research. A large number of new forms were discovered, and our knowledge of the *Diatomaceæ* especially received a great increase by the discovery of extinct species. Ehrenberg's great work on this subject, "Mikrogeologie," appeared in 1854. The great industry he displayed is evidenced by the fact that no less than 264 papers stood under his name in the Royal Society's Catalogue. Martins dedicated a genus of *Zygophylleæ* to Ehrenberg, but it has been since reduced to *Kallstrœmia*.

Original Articles.

ON *COINOCHLAMYS*, A WEST AFRICAN GENUS OF ACANTHACEÆ.

By S. Le M. Moore, F.L.S.

(Tab. 182.)

In a collection of Angolan plants made by M. Soyaux under the auspices of the German African Society, which has recently been sent to Kew from Berlin, there occurred a species of *Coinochlamys*, a rather curious genus, some time since established in manuscript by the late Dr. Anderson, but first characterised by Mr. Bentham in the recently published part of the "Genera Plantarum." Unfortunately the type-specimen—one of Mann's Bagroo River discoveries—is so fragmentary that Mr. Bentham was not able to give a full generic characterisation, and it is partly on this account, and partly because the genus is sufficiently peculiar to warrant special notice, that I have drawn up the following emendation, with diagnoses of the two known species and a few remarks on affinity and noteworthy points of structure.

Coinochlamys, *T. And.*, *Benth. & Hook. f. Gen. Pl.* ii., p. 1091.

Char. Emend.—Bracteæ 2, ovatæ, arcte applicatæ, basi subconnatæ, flores 3-5 includentes, marcescentes. Calyx involucro multo brevior, 5-partitus, segmentis lanceolatis vel ovato-lanceolatis acuminatis. Corollæ tubus rectus, superne ampliatus; limbus patens, lobis 5 latis rotundatis parum inæqualibus imbricatis nec contortis. Stamina 4, didynama, vel 5, medio tubo affixa, inclusa; antheræ ovatæ, 2-loculares, loculis discretis parallelis æqualibus muticis. Discus annularis. Stylus filiformis, apice subæqualiter bifidus, segmentis lobis 2 stigmatiferis clavatis coronatis; ovula in quoque loculo 2, retinaculo communi suffulta. Capsula a latere compressa, rotundata; semina 2 vel 4, plano-convexa, sericeo-pubescentia.—Suffrutices ramis divaricatis, alternis. Folia opposita, subsessilia, ovata, integerrima. Involucra ad apices ramulorum solitaria, breviter pedunculata. Corollæ involucro duplo longiores, singillatim evolutæ.

Cortex pubescens. Folia matura $\frac{3}{4}$-1 unc. long. Involucrum ovatum, $\frac{1}{4}$ unc. lat. . . .	*C. hirsuta.*
Cortex nitidus, glabrescens. Folia matura 1-2$\frac{1}{4}$ unc. long. Involucrum ovato-rotundatum, $\frac{1}{2}$ unc. lat.	*C. angolana.*

1. C. hirsuta, *T. And. MSS.*, *Bth. l.c.*—Caulis erectus, teres, cortice subcinereo pubescente cinctus; ramuli ultimi hirsuti, ætate pubescentes. Folia ovata, acuta vel mucronulat

utrinque precipue ad nervos hirsuta, $\frac{3}{4}$-1 unc. long., vix $\frac{1}{2}$ unc. lat., membranacea. Pedunculus $\frac{1}{6}$ unc. long., hirsutus. Involucri bracteæ ovatæ, acutæ, $\frac{1}{3}$ unc. long., $\frac{1}{4}$ unc. lat., pilis strigosis sparse munitæ. Corolla $\frac{2}{3}$ unc. long., extus obscure puberula; limbo $\frac{1}{3}$ unc. lat. Stamina 4, didynama (*fide* Bth.). Reliqui characteres videre non potuimus.

Hab.—Ad fluv. Bagroo, Afric., Occid. coll. Mann (no. 811). Specimen unicum in Herb. Kew conservatum.

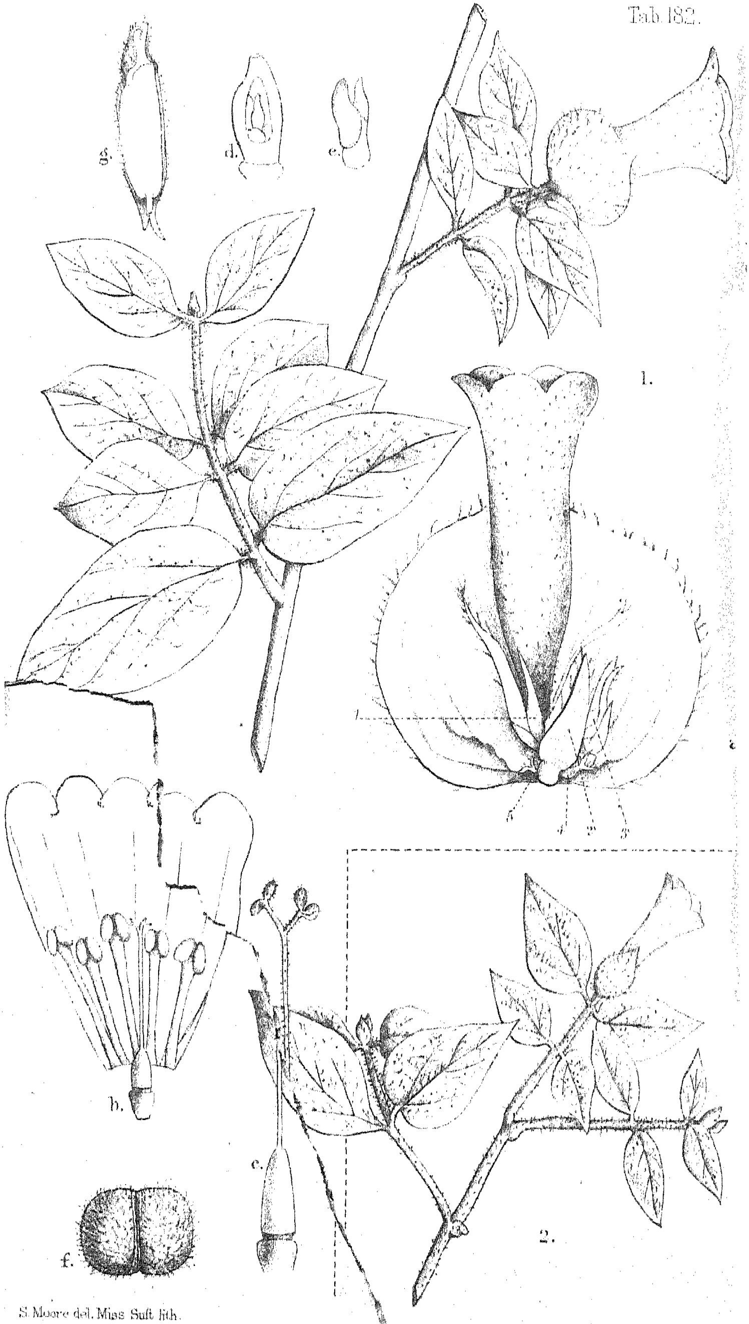
2. C. ANGOLANA, *sp. nov.*—Caulis tenuis, teres, cortice nitido glabrescente munitus; ramuli juniores villosi. Folia ovata, acuta, cuspidata, vel mucronulata, 1-2$\frac{1}{4}$ unc. long., $\frac{3}{4}$-1$\frac{1}{2}$ unc. lat., pilis strigosis sparse obtectis. Pedunculus $\frac{1}{6}$ unc. long., glabrescens. Involucri bracteæ ovato-rotundatæ, acutæ, $\frac{2}{3}$ unc. long., $\frac{1}{2}$ unc. lat., piloso-hirsutæ. Flores quoque in involucro 5, singillatim evolutæ. Calyx 5-partitus, segmentis lanceolatis, sparse ciliatis, inæqualibus, duobus majoribus $\frac{1}{4}$ unc. long., duobus alteris $\frac{1}{6}$ unc. long., uno minore $\frac{1}{12}$ unc. long., glabrescente. Corolla $\frac{3}{4}$ unc. long., limbo circiter $\frac{1}{2}$ unc. lat., extus et intus puberula. Stamina in nostro examplario 5, subæqualia; filamenta crassa, superne ampliata, prope $\frac{1}{2}$ unc. long. Ovarium obturbinatum, leviter compressum, glabrum; stylus filamenta æquans, superne puberulus, segmentis stigmatiferis parum inæqualibus; ovula basalia, campylotropa, retinaculo communi suffulta. Capsulæ involucro marcescente cinctæ, rotundatæ, $\frac{1}{3}$ unc. lat., $\frac{1}{4}$ unc. long., a latere compressæ, hispidæ. Semina quoque in loculo 1 vel 2, plano-convexa, appresse sericeo-pubescentia.

Hab.—In regione Angolana coll. Soyaux (no. 156).

The genus is readily distinguished from other Acanthaceæ by its possession of alternate branches and an involucre investing several flowers which open in succession. It remains to be seen whether the pentandry of *C. angolana* is a constant character; but it may be remarked that in abnormal flowers of at least two genera, *Strobilanthes* and *Barleria*, 5 stamens are occasionally met with. The singleness of the ovular retinaculum is worthy of notice, and the stigma, more like that of a *Cordia* than of an Acanthad, is unique in the Order, and seems much better adapted for receiving pollen than is an ordinary stigma of this family. With regard to affinities, there seems no reason to doubt its close connection with *Barleria* and the monotypic Malagash genus *Periblema*. From both of these it is distinguished by its alternate branches, single retinaculum, and stigma; further, its involucrate flowers and absence of bracteoles separate it from *Barleria*, while the many-flowered involucre affords another character by which to separate it from the solitary-flowered *Periblema*.

When the highly specialised inflorescence of this genus is taken into consideration, it can scarcely be doubted, seeing that the involucra crown the branches, that it has descended from a form which had an elongated floral axis, on which the flowers were borne, from analogy with *Barleria*, probably in spikes. Specialisation apparently commenced by the pair of leaves at the base of the inflorescence—whether foliage leaves or bracts cannot at present be determined—taking on

Tab. 182.



S. Moore del. Miss Suft lith.

Mintern Bros. imp.

1, Coinochlamys angolana, *S. Moore.* 2, C. hirsuta, *T. And.*

the function of protection for the young buds; and, as the presumed fact of this modification is very strong evidence of its utility, the tendency to protection of the entire inflorescence may have been aided by the death of all buds that were placed too high on the axis to be long covered by the basal leaves, and by the elimination as useless structures both of the buds and of the axis which supported them: in this way we should arrive by successive steps, first at the inflorescence of *Coinochlamys*, and then at that of *Periblema*. In *Barleria* the function of bud-protector is taken on by the bracts, each bract covering its own flower, and it is significant that here we find two bracteoles at the base of each of the flowers. In order to account for the absence of bracteoles from *Coinochlamys* and *Periblema*, it seems to be necessary to think that the function of the bracteole is accessory to that of the bract, and that, as the budding inflorescence is completely covered by the involucre in these two genera, bracteoles have become superfluous.

It is to be hoped that seeds of these plants will soon find their way to Europe, for it is only by a study of the growing plant that the finer facts of morphology can be apprehended.

EXPLANATION OF PLATE 182.

Fig. 1.—*Coinochlamys angolana* (nat. size). *a*. Involucre opened, showing 5 flowers, of which one only is expanded (mag.). *b*. Corolla opened (mag.). *c*. Ovary, style, and stigma (mag.). *d*. Ovary opened, showing the 2 basal ovules on a single retinaculum (mag.). *e*. The two ovules seen under higher power. *f*. Capsule (nat. size). *g*. Seed in long section (mag.).

Fig. 2.—*C. hirsuta* (nat. size).

DESCRIPTIONS OF NEW SPECIES AND VARIETIES OF PALMS COLLECTED IN THE VALLEY OF THE AMAZON IN NORTH BRAZIL, IN 1874.

BY JAMES W. H. TRAIL, M.A., M.B., F.L.S.

ARECINEÆ.

Genus GEONOMA.

§ 1. *Holospadices*.—Spadix simplex, pedunculo elato, spathis linearibus superante.

* Tubus stamineus florum ♀ in lobos 6 ligulatos fissus.

1. G. TAMANDUÁ, sp. n. (Trail hb. Palm, 183).[†]—Acaulis; foliis bifurcis, iis *G. Spixianæ* simillimis, $1{\cdot}5^{\mathrm{m}}$-2^{m}, atroviridibus, valide plicatis; venis primariis utrinque 25-27, fere rectis, angulo costali 10°-12°; petiolo brevi ($0{\cdot}15^{\mathrm{m}}$) supra profunde canaliculato; spadicibus $0{\cdot}6^{\mathrm{m}}$-$1{\cdot}0^{\mathrm{m}}$, rachibus $0{\cdot}25^{\mathrm{m}}$-$0{\cdot}32^{\mathrm{m}}$ obtusis; alveolis dense 10-11-stichis, labio inferiore bifido, tomentoso; spatha interiore dimi-

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[†] The following described species and varieties of Palms are deposited in Kew Herbarium under the numbers quoted for each.

dium spadicis vix superante, exteriore interiore duplo breviore; fl. ♂ corolla calyce duplo longiore.

Hab.—In sylvis nunquam inundatis ad fl. Javary; floret mense Decembro. "Tamanduá pecu," vel "Tamanduá ubim" nuncupatur.

2. *G. acaulis*, Mart., subsp. *Tapajotensis* (Trail hb. Palm, 9).—*G. acauli* minor; foliis brevioribus (vix 1^m) et tenerioribus, pinnis 3-4-jugis rhomboideo-lanceolatis, ·22^m-·35^m × ·035^m-·09^m; venis primariis utrinque 20-22, bis flexis; angulum costale 30°-60° medio efformantibus; petiolo (vagina inclusa) ·45^m-·55^m supra canaliculato; spadicibus ·5^m-·6^m, rachibus ·05^m-·075^m × ·003^m cauda sterili ·012^m mucronatis; alveolis 6-7-stichis; spathis coriaceo-membranaceis, interiore ·14^m-·15^m, exteriore ·05^m-·06^m; floribus *G. acaulis;* fructibus (vix maturis) globosis, pisi minoris magnitudine.

Hab.—In sylvis humidis, hiberno inundatis, ad Aramanahy prope fl. Tapajoz; flores et fructus inveni mense Januario.

3. G. CAMANÁ, sp. n., an *G. Jussieuana*, Mart., subsp. (Trail hb. Palm, 182).—Caudescens, caudice 1·0^m-1·4^m × ·025^m-·040^m erecto vel flexuoso, annulis multis cincto, ligno albo, mollissimo; foliis 1·4^m-2·4^m subregulariter innatofissis, pinnis 17-31 (plerumque 17-21) jugis, uni- vel biveniis, angustis, subfalcato-acuminatis, apicalibus latioribus, glauco-viridibus; venis primariis utrinque 25-36, bis flexis; petiolo ·6^m-1·2^m supra sulcato; spadicibus ·45^m-60^m, rachibus ·15^m-·20^m, obtusis; alveolis 15-stichis, labio inferiore prominulo, emarginato; spathis æquilongis ·225 -·300^m, linearibus, ancipitibus; fl. ♂ sepala petalis majora; fl. ♀ ——; fructibus ovalibus, scabris nigris, ·009^m × ·006^m.

Hab.—In sylvis humidis ad ripas fluminum Javary et Jutahi, ab indigenis Juriti-ubim vel Assai rana (i.e., *Euterpe* sp. spuria) nuncupatur.

Obs.—From *G. Jussieuana*, Mart. (Palm. Orbign., p. 24 t. xv., f. 1, et t. xxiii., f. A).—This Palm differs in the longer leaves, more numerous pinnæ, blunt rachis only half as long as the peduncle, and in the oval fruits. The localities are also very distinct, *G. Jussieuana*, Mart., occurring on rocky mountain slopes, while *G. Camaná* occurs in low-lying, rather swampy forests.

** Tubus stamineus ore breviter 6-dentatus.

4. *G. elegans*, Mart., var. *Amazonica* (Trail hb. Palm, 133).—Hæc varietas ab exemplis typicis in provinciis Bahiensi et Rio de Janeiro lectis differt ut infra; foliis simplicibus, bifurcis, dein varie et irregulariter pinnatisectis, laciniis utrinque 2-5, sæpe 3-jugis oppositis; venis primariis utrinque 24-28; spadicibus ·10^m-·30^m, rachibus ·05^m-·20^m; spathis pedunculum superantibus, laceris; alveolis 6-8-stichis; fructibus subglobosis.

Hab.—In sylvis nunquam inundatis ad ostia fluminis Jutahi.

Obs.—Readily distinguished from typical *G. arundinacea* by the spadix; from *G. pycnostachys* by the leaves, by the subglabrous spadix, and by the rather prominent and entire lip of the alveoli.

§ 2. *Schistospadices.*—Spadix ramosus, ramis simplicibus vel inferioribus etiam ramosis.

† Floris ♀ tubus stamineus cylindricus, ore breviter 6-dentatus.

‡ Alveoli 3-natim verticillati (rarius 4-natim, vel sub-5-7-stichi) labio inferiore integro vel emarginato.

5. G. OLIGOCLONA, sp. n. (Trail hb. Palm., nos. 171, 201).—*G. gracilis*, caudice 1·0^{m}-2·5^{m}, diam. ·012^{m} ; foliis ·60^{m}-1·0^{m} pinnati-sectis; petiolo (vagina ·10^{m} inclusa) ·30^{m}-·45^{m} supra canaliculato, pinnis trijugis, oppositis, jugis 2 inferioribus confertis rhomboideo-acinaciformibus, tenui-acuminatis ·20^{m}-·28 × ·04 -·07^{m}, apicalibus latioribus ·28 × ·075^{m}-·100^{m} ; pinnis papyraceis, nitenti-viridibus; venis primariis utrinque 23-24, bis flexis, ·12 -·20^{m}, iis pinnarum inferiorum medio angulum 70°-90° cum costa efformantibus, iis pinnarum apicalium angulum 40°-50° ; spadicibus rubris, 4-8 in quaque stirpe infra folia ortis, pedunculo erecto, spathis firmis ovatis brevibus (·035^{m}-·060^{m}) velato, apice in ramos 2-4 (rarius 5) simplices ·175^{m}-·275^{m} × ·004^{m}, decumbentes fisso; alveolis 3-natim verticillatis, raro 6-stichis, labio inferiore integro, apiculato; floribus iis *G. paniculigeræ* simillimis ; fl. ♂ corolla calyce dimidio vel duplo longiore ; fl. ♀ tubo stamineo lageniformi-cylindrico, ore breviter 6-dentato ; fructibus——.

Hab.—In sylvis primævis ad Barreiras de Tunantins ; et ad fl. Solimoês, ad "Barreira branca" ad fl. Jutahi, floret mensibus Decembro et Januario.

Obs.—This species is very like *G. aspidiifolia*, Spruce, in habit, leaves, spathes, and few-branched spadix ; but differs in the length and direction of the branches, in the arrangement of the alveoles, and in the 6-toothed staminal tube of the ♀ fl.

6. *G. laxiflora*, Mart. (Trail hb. Palm., 59 et 116).—Caudice flexuoso, 1·80 -4·80^{m} × ·012^{m} ; foliis terminalibus ·60^{m}-·75^{m} simplicibus bifurcis, vel ·45^{m}-·60^{m} varie pinnatisectis, pinnis 2-jugis ligulari-rhomboideis subfalcato-acuminatis vel pinna graminea interposita; venis utrinque 18-22, bis flexis, medio angulum 25°-30° cum costa efformantibus, subtus pubescentibus ; petiolo (vagina inclusa) ·15^{m} supra profunde canaliculato ; spadicibus ·30^{m}-·45^{m} rubris, pedunculo ·075^{m}-·100^{m} erecto, spathas firmas breves (·035^{m}-·050^{m}) superante, ramos plerumque 9-10 simplices vel infimos bifidos, tenues, pendulos, ·25^{m}-·30^{m} proferente ; alveolis ad basin rami irregulariter 5-6-stichis, supra 3-natim verticillatis, verticillis remotiusculis, labio inferiore truncato, integro vel emarginato ;

fl. ♂, corolla calyce duplo longiore; fl. ♀ tubo stamineo ore breviter 6-dentato; fructibus ovalibus, pisi magnitudinis, leviter tuberculosis, atro-viridibus.

Hab.—In locis umbrosis inundatis ("Ygapó") ad flumina Solimoês, Madeira, Purus, Juruá, Jutahi, et Javary.

Var. *depauperata* (Trail hb. Palm., 116 in parte).—Minor, caudice 1·80^{m}-2·40^{m} × ·004^{m}-·006; foliis bifurcis, nec pinnatisectis, furcis triangularibus ·30^{m} × ·030^{m}; venis utrinque 12-14, subrectis, angulo costali 20°-22°; spadicis ramis 2-3, tenuissimis, ·15^{m}-20^{m}; spathis ·025^{m} vel brevioribus.

Hab.—Cum forma typica.

Obs.—This variety resembles *G. chelidonura*, Spruce, very closely in the leaves, but is well-distinguished from it by other points.

7. *G. paniculigera*, Mart. (Trail hb. Palm., 193, 187, 177, 157, 153, 131, 200, 70-74).—Caudice 1^{m}-5^{m} × ·008^{m}-·038^{m}, flavo, nitente, erecto vel subflexuoso; foliis (8) 12-30 contemporaneis, ·60^{m}-1·50^{m}, varie pinnatisectis, pinnis plerumque 3-jugis oppositis rhomboideis tenui-acuminatis (vel pinnis 1-2-jugis gramineis univeniis interpositis) planis, papyraceis vel subcoriaceis, nitentibus, læte vel glauco-viridibus; venis utrinque 23-36 subrectis vel bis flexis, angulum 20°-50° medio cum costa efformantibus; spadicibus infra folia ortis ·25^{m}-·50^{m}, purpureo-badiis pubescentibus, pedunculo ·05^{m}-·15^{m} bracteis 4-8 stipitato, rachi ·05^{m}-·15^{m} ramos 12-4 simplices vel inferiores in ramulos 2-6 fissos proferente, ramulis subæquilongis, tenuibus ·125^{m}-·250^{m}; spathis parvis ·05^{m}-·10^{m} × ·018^{m}-·025^{m} obovato-lanceolatis, coriaceis; alveolis 3- (rarius 4-) natim verticillatis (raro 5-7-stichis) labio inferiore integro vel emarginato; fl. ♂ sepala petalis dimidio vel duplo breviora; fl. ♀ tubo stamineo ore breviter 6-dentato; fructibus globosis, ·005^{m}-·006^{m} nigris, leviter tuberculosis.

Hab.—In sylvis nunquam vel raro inundatis ("Barreiras") per totam plagam æquinoctialem Brasiliæ.

α. Var. *papyracea* (Trail hb. Palm., 193, 187).—Caudice 1·5^{m}-2·4^{m}; foliis 1·20^{m}-1·50^{m}, lamina ·75^{m}- 90^{m} + ·30^{m}-·40^{m} *papyracea*, varie pinnatisectis, pinnis 2-3 jugis, alternis vel sub-oppositis triangulari-rhomboideis; venis utrinque, 30-34 fere rectis, angulo costali 20°-30°; spadice ·45^{m} ramos 9-13 simplices vel 2-7 infimos 2-7-fidos proferente, ramulis ·20^{m}-·25^{m}; spathis ·10^{m}.

Hab.—Ad fl. Javary, floret mense Decembro, "Ubim-mimbeca" Singoageral.

No. 193, rami 8 inferiores bracteis subulatis ·025^{m}-·050^{m} stipitati sunt.

β. Var. *cosmiophylla* (Trail hb. Palm., 177, 151, 153, 200).—Caudice 1·80^{m}-5·0^{m} × ·012^{m}-·038^{m}; foliis ·75^{m}-1·35^{m} supra nitidis glauco-viridibus, regulariter pinnatisectis, subcoriaceis, pinnis 3-jugis, oppositis rhomboideo-subfalcatis, $\cdot 20^{m}$-$\cdot 50^{m}$ × $\cdot 050^{m}$-$\cdot 100^{m}$, vel jugis 2 pinnarum graminearum interpositis; venis utrinque (23·) 28-36, ad basin flexis, medio rectis, angulo costali 30°-48°, apice incurvis; spadice $\cdot 30^{m}$-$\cdot 45^{m}$, ramos 10-12, 3-5 infimos ramulos 2-6-edentes proferente, ramuli $\cdot 125^{m}$-$\cdot 250^{m}$; spathis teneris, caducis, $\cdot 075^{m}$-$\cdot 100^{m}$.

Hab.— Per totam provinciam Amazonensem.

Sub var. *gramineifolia* (Trail hb. Palm., 177 in parte, et 200 in parte).—Pinnis 12-16-jugis gramineis, plerumque univeniis $\cdot 225^{m}$-$\cdot 350^{m}$ × $\cdot 009^{m}$, basalibus, apicalibus et aliis mediis latioribus ligulari-rhomboideis, 2-10-veniis.

Hab.—Cum forma typica ad Tabatinga et ad Barreiras de Maturá in ripas fl. Solimoês, et ad fl. Javary.

γ. Var. *microspatha* (Trail hb. Palm., 70, 71, 72, 73, 74, 131; = *Geonoma microspatha*, sp.n., Spruce hb. Palm., 28.)—Caudice $\cdot 90^{m}$-$1\cdot 80^{m}$ × $\cdot 008^{m}$-$\cdot 012^{m}$; foliis $\cdot 60^{m}$-$\cdot 90^{m}$ iis var. *cosmiophyllæ* similibus sed minoribus, tenuioribus, et rarius nitentibus, pinnis 3-jugis oppositis, rarius 2 gramineis interpositi ; venis utrinque (24) 27-29, angulo costali 30°-46 ; spadice subglabro, vix $\cdot 3^{m}$, ramos 8-10 simplices vel solum 2 infimos bifidos vel trifidos $\cdot 10^{m}$-$\cdot 20^{m}$ proferente; spathis $\cdot 038^{m}$-$\cdot 060^{m}$.

Hab.—Ad flumina Negro et Purus.

Obs. 1.—*G. flaccida*, Wendland, seems identical with *G. paniculigera*, Mart.

Obs. 2.—*G. trijugata*, Barb. Rod. (Enum. Palm. nov. Amazon, 1875, no. 9, p. 12), so far as can be made out from the very brief description, is *G. paniculigera*, var. *microspatha*.

Obs. 3.—It is somewhat difficult to determine whether the variety *papyracea* or *cosmiophylla* is the type of Martius' species, as the figure in Palm. Bras., t. x., shows the latter form, while the description applies rather to the former. I have not followed Martius' division into the varieties *hirsutula* and *glabrata*, as I have not observed the spadices notably more pubescent than in other *Geonomæ*, nor have I observed marked difference between different examples of this very common species.

‡‡ Alveoli obscure 5-stichi, labio inferiore bifido.

8. G. LEPTOSPADIX, sp. n. (Trail hb. Palm., 172).—Caudice arundinaceo, $\cdot 15^{m}$-$\cdot 90^{m}$ × $\cdot 010^{m}$, fulvo, glaberrimo; foliis 10-12 contemporaneis, simplicibus, bifurcis, $\cdot 60^{m}$-$\cdot 75^{m}$, lamina $\cdot 50^{m}$ × $\cdot 10^{m}$-$\cdot 125^{m}$, membranacea supra subtusque læte viridi; ala quaque triangulari-rhomboidea, acumine paullo incurvato, margine exteriore ultra medium emargi-

nato; venis primariis utrinque 27-28, haud conspicuis, rectis, angulo costali 21°-23°; vagina ·075^{m}; petiolo ·050^{m} supra sulcato, costa ·30^{m}-·38^{m}; spadicibus 3-14 subcontemporaneis, rubris, ·25^{m}-·38^{m}, pedunculo ·13^{m}-1·18^{m} compresso, spadicis florentis erecto, dein plerumque sæpe inflexo, ramos 5, infimum bifidum, tenuissimos, ·15^{m}, cauda sterili apiculatos proferente; spathis ·075^{m} × ·010^{m} ancipitibus, papyraceis; alveolis longe dissitis, obscure 5-stichis, magnis, labio inferiore profunde emarginato vel bifido; fl. ♂ petalis sepala subæquantibus ad medium coalitis; fl. ♀ tubo stamineo urceolato, ore subintegro vel brevissime 6-dentato; fructibus globosis, diam. ·006^{m} et supra, leviter tuberculosis, nigro-purpureis.

Hab.—In sylvis primævis nunquam inundatis ad Tonantins et ad Fonteboa in prov. Amazonas.

Obs. 1.—The stem is almost always buried under a mass of earth and rubbish, in which lie the fruiting spadices, a position favoured by the peduncle being very much shortened by its repeated flexures. May not this habit (not shared in by any other species that I am acquainted with) favour the development of the seeds, as in *Trifolium subterraneum*, *Arachis hypogæa*, &c.? On one occasion I found a specimen about 3 feet high, bearing spadices with mature fruit, though its stem was clear of the usual accumulation. The large number of spadices occurring in nearly the same stage of development is also remarkable. On one plant I found fourteen spadices, the lower ten bearing fruits, the others flowers.

†† Fl. ♀ tubus stamineus trigonus, ore 3-crenatus vel in lobos 6-digiti formes ad medium fissus; alveoli 5-7-stichi, labio inferiore bifido.

9. G. SPRUCEANA, sp. n. (Trail hb. Palm., 24, 41, 42, 43, 170, 176, 164, 125, 120, 174, 29, 111, 93, 147, 47, 25, 26, 118, 56, 84, 89, 138, 90, 97, 54, 143, 144).—Caudicibus 3-4 ex eodem rhizomate ortis, 1·20^{m}-2·40^{m} (rarius 3·0^{m}-6·0^{m}) × ·008^{m}-·025^{m}; foliis pinnatisectis ·75^{m}-1·20^{m} (rarius ·45^{m} vel 1·20^{m}-1·80^{m}), petiolo 30^{m}-·70^{m} incluso; costa ·15^{m}-·55^{m}; pinnis 2-21-jugis lanceolato-rhomboideis vel ligularibus vel gramineis, subfalcato acuminatis subcoriaceis, supra subtusque concoloribus ·30^{m}-·60^{m} (rarius ·15^{m}-·30^{m} vel ·60^{m}-·75^{m}) × ·009^{m}-·075^{m} (rarius ·112^{m}); venis primariis utrinque 16-20 (11-15), bis flexis, angulum 20°-40° (40°-60°) cum costa efformantibus, pinnis gramineis semper triveniis (i.e., vena primaria 1, venis secondariis 2); spadicibus ·20^{m}-·30^{m} (rarius ·15^{m}-20^{m} vel ·30^{m}-·40^{m}) rubris vel viridibus, ramos 8-16 (4-8) simplices vel 2-8 infimos ramulos 2-6-fissos cauda sterili acuminatos ·075^{m}-·125^{m} (·035^{m}-·075^{m}) vel ·15^{m} subrectos vel subdecumbentes proferentibus, pedunculo ·075^{m}-·10^{m} compresso; spathis lanceolatis vel lato-lanceolatis, obtusis ·075^{m}-·112^{m} (·112^{m}-·175^{m})

coriaceo-membranaceis, cito caducis, vel firmiusculis; alveolis 5-6-7-stichis; fl. ♂ sepalis petala subæquantibus vel brevioribus; fl. ♀ tubo stamineo corollam subæquante, ore 3-crenato sed in lobos 6-digitiformes fissili, vel ab initio in lobos 6 ad medium fisso; fructibus ovalibus vel subglobosis, diam. ·006^m-·012^m tuberculosis viridibus (nigricantibus?) vel nigris; epicarpio sicciusculo.

Hab.—In sylvis per totam plagam Amazonensem.

Subsp. an var. 1. *Spruceana* (Trail hb. Palm., 24, 41, 42, 43, 170, 176, 164, 125).—Foliis 1^m et ultra, pinnis 2-4 (raro 5-9) jugis; venis utrinque 17-20; spadice ·25^m et ultra, ramos 10-15, 4-10 infimos ramulos 2-7-edentes proferente; alveolis plerumque 5-stichis; fl. ♀ tubo stamineo ore 3-crenato; fructibus ovalibus, pisi majoris magnitudine.

Var. α. *heptasticha* (Trail hb. Palm., 93, 111).—Alveolis 7-stichis.

Hab.—Prope Manaos.

Var. β. *micra* (Trail hb. Palm., 29, 120?).—Foliis ·90^m et infra, pinnis minoribus; venis utrinque 16-17; spathis papyraceis caducis; spadicis ramis 7-10 simplicibus.

Hab.—Ad Lago Juruty.

Subsp. an var. 2. *intermedia* (Trail hb. Palm., 147, 47, 25, 26, 118, 56) (=*G. pauciflora*, Spruce hb. Palm., 16, nec Martii).—Foliis 1^m et infra, pinnis 8-17 jugis omnibus vel plerisque linearibus (·009^m latis); spadicis ·175^m-·225^m, ramis 8-13 simplicibus vel 1-2 infimis bifidis; alveolis 5-6-stichis; fl. ♀ tubo stamineo ore 3-crenato; fructibus ovalibus vel globosis pisi magnitudine

Hab.—In sylvis ubique.

Subsp. an var. 3. *compta* (Trail hb. Palm., 84, 89, 138). —Foliis 1^m et ultra, pinnis 14-21-jugis linearibus; spadicis ramis 8-13 simplicibus vel infimis 2-5-fidis; spathis fragilibus; alveolis plerumque 6-stichis; fl. ♀ tubo stamineo in lobos 6 digitiformes ad medium fisso; fructibus ovalibus viridibus (nigricantibus?) pisi magnitudine.

Hab.—In sylvis ad Barcellos, et ad Barreiras de Mary fl. Purus, etiam ad Barreiras de Mutum fl. Jutahi.

Subsp. an var. 4. *tuberculata* (Trail hb. Palm., 97, 90, 54, = *G. tuberculata*, Spruce (sp.) hb. Palm, 18).—Caudice arundinaceo, ·30^m-1·50^m × ·006^m-·012^m; foliis ·30^m-·60^m, pinnis bijugis rhomboideo-acinaciformibus vel pinna impari graminea interposita, ·175^m-·375^m × ·01^m-·05^m; venis primariis utrinque 12-15; spadicibus ·175^m-·225^m ramos 4-8 simplices vel infimum bifidum tenues proferentibus; alveolis obscure 5-stichis; fl. ♀ tubo stamineo in lobos

6 digitiformes ad medium fisso; fructibus globosis magnitudine pisi minoris.

Hab.—Ad fl. Taruma prope Manaos, et ad fl. Marnellos brachium fl. Madeira.

Var. *major* (Trail hb. Palm., 144).—Foliis ·90^m et supra, pinnis ·38^m-·45^m × ·06^m; venis primariis utrinque 19-20; spadicibus ·225^m et supra, ramos 12-14 infimos 2-4 fidos edentibus.

Hab.—Ad Coary in prov. "Amazonas."

Obs. 1.—*G. Spruceana*, mihi, as may be seen from the above description, includes several forms of which well-marked specimens seem very distinct, but the connecting links are so close and continuous as to render it impossible to rank them as distinct species, and I am by no means sure that they deserve even the rank of subspecies, though they may be divided into two groups by the staminal tube in the female flower, the first including *Spruceana* proper and *intermedia*, the second (in which the tube is split into six lobes from the first, and spreads outside the corolla during flowering) *compta* and *tuberculata* (Spruce). In absence of ♀ flowers the form *tuberculata* is hardly distinguishable from *Spruceana*, var. *micra;* and *tuberculata*, var. *major*, is then identical in appearance with typical *Spruceana*. The forms *intermedia* and *compta* also can hardly be distinguished from one another in some cases.

Obs. 2.—*Geonoma rectifolia*, Wallace (Palms of the Amazon, p. 67, t. xxxv.), may be a form of *Spruceana mihi*, but I do not quote it as a synonym, owing to the figure and description representing the median pinnæ as broad as the basal and apical, instead of linear, the spadices small and simply branched, and the fruits globular; the last two characters would seem to point to *G. tuberculata*, Spruce.

Obs. 3.—*G. Spruceana*, subsp. *compta*, is very close to *G. Negrensis*, Spruce, from which it is distinguished by the linear pinnæ being 5-veined in the latter, 3-veined in the former.

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10. CALYPTRONOMA? ROBUSTA, sp. n. (Trail hb. Palm., 186).—Caudice solitario erecto 3·50^m-5·0^m × ·035^m-·050^m, obscure sed crebre annulato; foliis 12-14 contemporaneis ad apicem caudicis, subhorizontaliter patentibus 2·0^m-2·3^m, pinnatisectis; petiolo ·75^m supra plano, subtus acute carinato, glabro; vagina ·18^m in opus fibrosum retiforme producta; pinnis 5-6 (-7) jugis oppositis, raro alternis, lanceolato-rhomboideis vix subfalcatis, tenui-acuminatis, basalibus ·55^m × ·06^m, mediis ·70^m-·75^m × ·075^m-·1^m, apicalibus ·60 × ·075^m-·120^m; venis primariis utrinque 37-39, ·009^m dissitis, medio rectis angulum 20°-60° cum costa efformantibus, subtus unacum petiolo et costa furfure

ferrugineo sparse vestitis; spadicibus ·90^{m}-1·20^{m} puberulis, pedunculo decurvo, ·45^{m}-·90^{m} compresso; rachi ·10^{m}-·15^{m} ramos 7-17 simplices ·25^{m}-30^{m} crassos, obtusos proferente; alveolis magnis 9-10-stichis, labio inferiore prominulo decurvo; spathis (e fragmentis solum visis) membranaceo-coriaceis, rimosis ancipitibus ·30^{m}? × ·018^{m}; fl. ♂ et ♀ ?; fructibus ovalibus, apice basique acutis, ·020^{m} × ·011^{m}, nigris?; epicarpio tenui, crustaceo; mesocarpio fibrillis crassis, albidis, lignosis arcuatis et reticulatis percurso; endocarpio lævi, tenui; testa nigro-badia hilo albo cincta, albumine albo, osseo, embryone basilari.

Hab.—In sylvis primævis ad fl. Javary spadices fructusque siccos mense Decembrio tulit; Indi hanc palmam Ubim uassu (i.e., *Geonomam magnam*) nuncupant.

Obs. 1.—I have referred this species to the genus *Calyptronoma*, Gries. (though doubtfully, owing to the want of flowers), on account of the great resemblance that the spadix bears to the spadices of *Calyptronoma Swartzii*, Gr., and of *C. dulcis* in the Kew Herbarium, as well as on account of the fibres that occur in the mesocarp, in which respect the fruits agree with fruits of *C. dulcis* at Kew. I have never seen similar fibres in the fruits of any true *Geonoma*.

Obs. 2.—The leaves are largely used for thatch where it occurs, as they are said to be very durable. I have been told that it occurs on the rivers Jandiatuba and Juruá.

11. MORENIA INTEGRIFOLIA, sp. n. (Trail hb. Palm., 157).—Caudice ·15^{m}-·60^{m}, ligno molli; foliis simplicibus bifurcis ·75^{m}-1^{m}; petiolo (vagina ·15^{m} inclusa) ·30^{m}-·50^{m}, costa ·45^{m}; alis triangulari-rhomboideis, ·60^{m} (secus marginem exteriorem) × ·075^{m}-·100^{m}, tenui-acuminatis, papyraceis, glabris; venis primariis utrinque 11-13, prominentibus, rectiusculis, angulo costali 19°-24°; margine exteriore serraturis-brevibus ad venas ornato; spadicibus ♂ 5-verticillatis simplicibus glabris, viridibus, ·52^{m}-·62^{m}; pedunculo ·30^{m}, spathis 4-5 sparse imbricatis ancipitibus, compressis, membranaceis, cito laceris obvelato; spatha suprema pedunculum superante; spadicis rachi tenui pro receptione florum sulcato; fl. ♂ solitariis, sparsis, 5-stichis; calyce cupulari, subtrigono, membranaceo, griseobadio; petalis 3 orbicularibus valvatis, atro-viridibus; staminibus 6 corolla brevioribus, filamentis tenuibus, antheris dorsifixis, loculis parallelis, erectis, apice basique liberis; pistilli rudimento minimo; fl ♀?; fructibus?

Hab.—In sylvis primævis ad Gaviaô in ripa occidentali fl. Juruá ad Camaná in ripa occidentali fl. Javary, et ad Tabatinga.

Var. *nigricans* (Trail hb. Palm., 157 A).—Caudice ·60^{m}-·90^{m}; foliis pinnatisectis, pinnis utrinque 3-5 rhomboideo-lanceolatis vel linearibus, apice subfalcato

acuminatis ·35^{m}-·45^{m}×·012 -·062^{m}; venis utrinque 15, angulo costali supra 25°; pinnis subcoriaceis siccando nigrescentibus; spadice, spathis &c., cum typo convenientibus.

Hab.—Ad Tabatinga.

Obs.—I have referred this species to the genus *Morenia* on account of the whorled ♂ spadices, though with some doubt in absence of ♀ spadix, flowers, and fruit.

12. *Manicaria saccifera*, Gærtn., var. *mediterranea* (Trail hb. Palm., 110 et 38? [fruits only]). — Var. forma typica minor; caudice 2^{m}-2·5^{m}×·15^{m}; foliis 3·20^{m}-3·60^{m} ×·90-1·20^{m} irregulariter pinnatisectis, pinnis linearibus vel oblongo-linearibus versus apicem conjunctis; venis primariis ·025^{m} dissitis, ad basin angulum 18°, directione media angulum 24° cum costa efformantibus; spatha interiore acuminata 1^{m}-1·20^{m}; fl. ♂ sepalis valde imbricatis ad basin cohærentibus, orbicularis petalis 2½-3-plo brevioribus; fructibus 1-3-pyrenis 1-2-3-globosis, pyrena quaque ·035^{m}-·050^{m}; epicarpio *M. saccifera*, Gærtn.

Hab.—In sylvis arenosis ("Catinga") prope Manaos ad fl. Tarumá; (etiam ad cataractas fl. Mauhes?) "Bussu," Lingoa geral.

Obs.—This variety seems to come close to *Manicaria Plukenetii*, Gries. et Wendl., in the pinnatisect leaves, in the spathe, and in the ♂ fl. It differs chiefly in the veins of the leaf being wider apart, and in the epicarp of the fruit.

13. *Iriartea* (*Catoblastus*, Wendl.) *pubescens*, Karst., var. *krinocarpa* (Trail, hb. Palm., 190).—Var. forma typica minor; caudice 3^{m}-5^{m} × ·018^{m}-·034^{m}; foliis 1·35^{m}-1·50^{m}, vagina ·30^{m}-·45^{m} brevissime badio-tomentosa, petiolo ·30^{m}, pinnis 10-11-jugis (apicalibus conjunctis) basalibus ·175^{m}×·018^{m}, mediis ·35^{m}-·40^{m}×·056^{m} 070^{m}, apicalibus conjunctis ·20^{m}×·12^{m}; spadicibus haud verticillatis sed 3-5 contemporaneis e nodis contiguis ortis, ramos 5 simplices, ·025^{m}-·125^{m}, pendulos, apice caudatos edentibus; fructibus ovali-cylindraceis, ·021^{m} × ·012^{m} puberulo-lanatis.

Hab.—In sylvis ad fl. Javary gregarie crescit.

Obs. 1.—Though differing considerably in the points noted above from Karsten's description and figures of *I. pubescens* in Flora Columb., vol. i., pp. 153-4, t. 81, it agrees so closely in all other points that it can hardly be regarded otherwise than as a variety of that species.

Obs. 2.—It resembles *I. setigera*, Mart., very much in habit, and might readily be mistaken for it at the first glance when not bearing inflorescence or fruit; it is most readily distinguished by the narrower, pubescent below, and more numerous pinnæ, though I have once or twice found leaves of *I. setigera*, Mart., with 8-10-jugate pinnæ. The two species inhabit similar localities (viz., forests not

subject to inundation), and seem to replace each other; at least I have found *I. setigera* abundant in the province of Amazonas as far west as the Rio Jutahi, but never met with *I. pubescens*, var. *krinocarpa*, save on the Javary, where it is abundant, but where I never saw *I. setigera*.

(*To be continued.*)

NEW GLADIOLEÆ.

By J. G. Baker, F.L.S.

Of the following unpublished species of Gladioleæ, all of which are Cape or Tropical African, I have labelled type-specimens in the herbaria either of Kew or the British Museum.

Gladiolus pubescens, *Baker*.—Bulbum non vidi. Caulis gracilis, pedalis et ultra, profunde striatus, dense griseo-pubescens, foliis 2-3 rudimentariis anguste linearibus strictis pilosis solum præditus. Spica secunda, 2-3-pollicaris, 3-6-flora. Spathæ valvæ lanceolatæ, glabræ, virides, acutæ, 6-10 lin. longæ. Perianthii tubus curvatus, infundibularis, 5-6 lin. longus; limbi segmenta rubella, oblongo-spathulata, acuta, 8-10 lin. longa. Antheræ ex tubo protrusæ, 3 lin. longæ. *Kaffraria britannica*, Cooper, 458! Stem and leaves of *G. laccatus*, Thunb. (*G. pilosus*, Ecklon), but flower much smaller, with acute segments.

G. (Hebea) cochleatus, *Baker*.—Bulbum non vidi. Folia omnia parva, linearia, glabra, acuta, rigidula, crebre nervata, superposita. Caulis gracilis, teres, sesquipedalis. Spica laxissima, semipedalis, 6-8-flora. Spathæ valvæ lanceolatæ, acutæ, virides, 6-8 lin. longæ. Perianthii tubus curvatus, infundibularis, 3-4 lin. longus; limbus horizontalis, 9-10 lin. longus, segmento superiori rubro oblongo-spathulato dorso diu convexo, reliquis oblanceolatis albidis obtusis longe unguiculatis. Genitalia perianthio paulo breviora. *Sierra Leone*, Morson! Allied to the Cape *G. permeabilis*, Delaroche (*G. edulis*, Burchell in Bot. Reg., t. 169). Only two other species of the genus are known in West Tropical Africa. There is one in Abyssinia, and three were gathered by Col. Grant.

G. splendens, *Baker*.—Folia inferiora anguste ensiformia, viridia, glabra, acuta, rigide coriacea, pedalia et ultra, 6-8 lin. lata, nervis 5-7 validis prædita. Caulis bipedalis, foliis pluribus linearibus reductis præditus. Spica laxissime 3-4-flora. Valvæ spathæ integræ, lanceolatæ, virides, 18-21 lin. longæ. Perianthium splendide coccineum, suberectum, 3 poll. longum, tubo recto deorsum cylindrico apice late infundibulari; segmentis subæqualibus obovato-spathulatis, cuspidatis, immaculatis, tubo superantibus. Genitalia perianthio distincte breviora. *C. B. Spei in ditione George ad montes prope Oakhurst*, W. D. Dumbleton, Esq.! Near *G. cruentus*, Bot. Mag., t. 5810, and one of the most showy of all the known species.

G. decoratus, *Baker*.—Bulbus globosus, 1 poll. crassus, tunicis membranaceis fibroso-reticulatis. Folia ensiformia, glabra, acuta,

rigide subcoriacea, nervis paucis validis prædita; inferiora subpedalia, 6-9 lin. lata. Caulis gracilis, glaber, teres, bipedalis, foliis paucis reductis præditus. Spica laxissima, subsecunda, semipedalis vel pedalis. Spathæ valvæ lanceolatæ, acutæ, integræ, 1-1½ poll. longæ. Perianthium splendide coccineum, tubo curvato 15-18 lin. longo, deorsum cylindrico, sursum late infundibulari; limbo horizontali tubo paulo longiori, segmentis tribus superioribus et inferiori oblongo-spathulatis obtusis, duobus interioribus inferioribus rotundatis longe unguiculatis, macula centrali lutea magna rubro marginata præditis. Genitalia perianthio vix breviora. Capsula oblongo-clavata, 1 poll. longa. *Terra fluminis Zambesi ad Moramballa*, Dr. Kirk! A very fine plant, allied to *G. Saundersii*, Hook. fil. in Bot. Mag., t. 5873, remarkable for the long narrow claw of the two lower inner perianth-segments, which have only a narrow border of red round a yellow middle.

G. CRASSIFOLIUS, *Baker.*—Bulbus globosus, 1 poll. crassus, tunicis crasse fibrosis. Folia subbasalia plura, anguste ensiformia vel linearia, pedalia vel sesquipedalia, 3-8 lin. lata, rigide coriacea, glabra, venis pluribus crassis stramineis percursa et marginibus stramineis incrassatis. Caulis strictus, pedalis vel sesquipedalis. Spica subsecunda, semipedalis vel pedalis, sursum densa, deorsum laxa. Spathæ valvæ lanceolatæ, acutæ, scariosæ, brunneæ, exterior 6-9 lin. longa. Perianthium rubrum, 1 poll. longum, segmentis oblongis, obtusis, tubo curvato infundibulari æquilongis. Genitalia perianthio paulo breviora. *Natal*, Gerrard, 561! 595! *Transvaal*, Dr. Atherstone! *Faku Territory*, Dr. Sutherland! *Orange Free State*, Cooper, 3185! 3199! Closely allied to *G. sericeo-villosus*, Hook. Bot. Mag., t. 5427, and one of the smallest and least showy in its flowers of the group of species with ensiform leaves.

G. MELLERI, *Baker.*—Bulbus globosus, tunicis membranaceis. Folia linearia, rigida, glabra, 3-4 lin. lata, costa et marginibus incrassatis stramineis, basalia pedalia. Caulis teres, strictus, glaber, sesquipedalis, foliis 3-4 rudimentariis instructus. Spica laxa, semipedalis vel pedalis. Spathæ valvæ lanceolatæ, acutæ, brunneolæ, membranaceæ, 18-24 lin. longæ. Perianthium rubrum, 21 lin. longum, tubo curvato late infundibulari 8-9 lin. longo; segmentis ascendentibus obovato-spathulatis obtusis inæqualibus, supremis 8-9 lin. latis. Genitalia limbo paulo breviora. *In ditione fluminis Zambesi, alt.* 3000 *pedes*, Dr. Meller! Dr. Kirk!

G. IGNESCENS, *Bojer MSS.*—Bulbus globosus, 1 poll. crassus, tunicis membranaceis purpureo-brunneis. Folia subbasalia 5-6, anguste linearia glabra, rigida, bipedalia et ultra, 3-4 lin. lata, acuminata, marginibus et costa incrassatis stramineis. Caulis teres, glaber, robustus, 2-3-pedalis, foliis paucis valde reductis præditus. Spica laxissime 2-4-flora. Valvæ spathæ lanceolatæ, acutæ, brunneo-viridulæ, 2-3 poll. longæ. Perianthium splendide coccineum, 3 poll. longum, tubo curvato anguste infundibulari; segmentis obovato-spathulato obtusis tubo æquilongis, supremo maximo horizontali, dorso convexo. Genitalia limbo paulo breviora. *Madagascaria centralis in montibus*, Hilsenberg & Bojer! Lyall, 158! Pool! This, again, is like *G. psittacinus* in flower, with very long narrow leaves. The Malagash name of it is "Torren-dahi."

G. NEWII, *Baker.*—Bulbum non vidi. Caulis glaber, teres, bipedalis. Folia 3-4, anguste linearia, glabra, rigida, 1½ 2 lin. lata, costa et marginibus stramineis incrassatis, inferiora pedalia. Spica laxe biflora. Spathæ valvæ lanceolatæ, acuminatæ, membranaceæ, rubellæ, 21-30 lin. longæ. Perianthium coccineum, 3-3½ poll. longum, tubo curvato anguste infundibulari 18-24 lin. longo; segmentis obovato-spathulatis obtusis 18 lin. longis, omnibus horizontalibus, tribus supremis 9-10 lin. latis. Genitalia limbo paulo breviora. Capsula chartacea obovoideo-oblonga 8-9 lin. longa, seminibus discoideis late alatis. *Regio temperata montis Kilimanjaro*, Rev. Mr. New! This must be a very fine plant, and from its locality is specially interesting. It appears that fine Gladioli are widely spread amongst the hills of Madagascar and Tropical Africa, and doubtless many more species remain to be discovered. The flowers of this resemble those of *G. psittacinus*, Hook. Bot. Mag., t. 3032.

G. ATRO-PURPUREUS, *Baker*.—Bulbus parvus, globosus, tunicis fibrosis, sursum subtiliter reticulatis præditus. Caulis gracilis, glaber, 1-2-pedalis, foliis 3-4 distantibus, parvis, linearibus, glabris, erectis, instructus. Spica laxa, secunda, 3-6-pollicaris, 4-8-flora. Spathæ valvæ lanceolatæ. virides, 6-9 lin. longæ. Perianthii atro-purpurei tubus curvatus infundibularis 5-6 lin. longus; segmenta oblongo-spathulata, inæqualia obtusa, 8-9 lin. longa, supremum horizontale maximum. Genitalia limbo paulo breviora. *In ditione fluminis Zambesi, alt.* 2000-3000 *pedes*, Dr. Kirk! Dr. Meller! Near the Cape *G. brevifolius*, Jacq. Ic., t. 249 (*G. hirsutus*, var. *brevifolius*, Bot. Mag., t. 727).

G. TENUIS, *Baker*.—Bulbum non vidi. Caulis gracilis, glaber, teres, flexuosus, bipedalis. Folia 2-3, distantia, superposita, anguste linearia, glabra, inferiora 9-12 poll. longa, 1-1½ lin. lata. Spica subsecunda, 3-4 poll. longa, laxe 5-6-flora. Spathæ valvæ lanceolatæ, virides, 9-12 lin. longæ. Perianthium suberectum, roseum, tubo infundibulari 9-12 lin. longo; segmentis inæqualibus obovato-spathulatis obtusis tubo subæquilongis. Stamina perianthio paulo breviora. *C. B. Spei*, Burchell, 7303! 7421! Nearly allied to *G. tenellus*, Jacq. Ic., t. 248.

BABIANA BAINESII, *Baker*.—Bulbus globosus, 10-12 lin. crassus, tunicis crassis fibrosis. Folia plura, anguste linearia, erecta, pedalia, 1½-3 lin. lata, plicata, subglabra, nervis validis percursa. Flores plures in corymbum ad terram sessilem congesti. Valvæ spathæ lanceolatæ, brunneæ, membranaceæ, acutæ, integræ, 15-18 lin. longæ. Perianthii tubus bipollicaris, erectus, apice infundibularis; limbus purpureus, irregularis, 18-21 lin. longus, segmentis oblongo-spathulatis, medio 3-4 lin. latis. Stamina limbo duplo breviora, antheris luteis 4½-5 lin. longus. Stylus antheras superans, stigmatibus tribus oblanceolatis. *Africa australis in ditione Transvaal*, Baines! McLea! (Bolus, 2654). Near *B. spathacea*, Bot. Mag., t. 638.

B. CUNEIFOLIA, *Baker*.—Bulbus globosus, 10-12 lin. crassus, tunicis crassis brunneis secus collum longe productis. Folia 3-4, basalia, coriacea, subglabra, oblique cuneata, 12-18 lin. longa, apice eroso-dentata, 6-9 lin. lata, plicato-nervosa. Flores 5-6 in spicam sessilem in centro foliorum congesti. Spathæ valvæ glabræ, virides, acutæ, lanceolatæ, 9-15 lin. longæ. Perianthii tubus ex spatha haud protrusus; limbus purpureus, erectus, 12-15 lin. longus, segmentis inæqualibus oblongo-spathulatis. *C. B. Spei*, Drege, 2627! A close ally of *B. flabellifolia*, Harvey; Klatt in Linnæa xxxv., 380, from Namaqualand.

B. DREGEI, *Baker*.—Bulbum non vidi. Folia basalia plura, lanceolata, crassa, coriacea, glabra, acuta, oblique petiolata, 6-9 poll. longa, medio 9-15 lin. lata, nervis validis percursa, marginibus stramineis valde incrassatis. Caulis brevissimus, spicis 2-3 densis congestis. Spathæ valva exterior dura, glabra, lanceolata, acuta, 18-21 lin. longa; interior minor, occulta, bifida. Perianthii tubus bipollicaris, apice infundibularis; limbus pollicaris, segmentis oblongo-spathulatis inæqualibus. Genitalia limbo subduplo breviora. *C. B. Spei*, Drege, 2628! Near *B. sambucina*, Ker, Bot. Mag., t. 1089.

WATSONIA CYLINDRICA, *Baker*.—Bulbum non vidi. Folia basalia 5-6, linearia, acuta, 5-6 poll. longa, 5-7 lin. lata. Caulis pedalis, foliis 2-3 valde reductis instructus. Spica 5-6-flora, 3-4 poll. longa, disticha. Spathæ valva exterior lanceolata, integra. Perianthii pallide rubri tubus 15-18 lin. longus, curvatus, e basi ad apicem sensim ampliatus; segmenta subæqualia, oblanceolata, 5-6 lin. longa. Filamenta ex tubo protrusa, antheris 2½ lin. longis basi profunde sagittatis. *Madagascaria*, Plant in Hort. Saunders, anno 1871. Habit of *W. humilis*, from which it recedes by its shorter limb and perianth-tube dilated gradually from the base to the throat. A drawing of the plant was made by Mr. Saunders for the "Refugium," but it has not been published yet.

W. DENSIFLORA, *Baker*.—Bulbum non vidi. Folia basalia ensiformia, 2-3-pedalia, medio 6-9 lin. lata, crassa, rigida, crebre distincte nervata, marginibus incrassatis stramineis. Caulis teres, bipedalis, foliis valde reductis instructus. Spica simplex, pedalis, densa, disticha, 40-50-flora. Spathæ valvis oblongis acutis integris brunneis, exterioribus 9-15 lin. longis valde imbricatis. Perianthii rubri tubus 15 lin. longus, dimidio inferiori filiformi, apice infundibulari; limbus pollicaris, segmentis oblanceolatis æqualibus acutis. Antheræ 5-6 lin. longæ, ex tubo protrusæ. Styli rami profunde bifidi. *C. B. Spei*, Drege, 4536! *Natal*, Plant, 29! Miss Armstrong! Cooper, 3186! *Orange Free State*, Cooper, 886! Well marked from all the many varieties of *W. Meriana* by its dense many-flowered distichous spike, the outer spathe-valves of which overwrap one another above the middle in a regular row on each side of the axis.

MONTBRETIA PAUCIFLORA, *Baker*.—Bulbus globosus, 5-6 lin. crassus, tunicis membranaceis. Folia basalia 2-3, anguste linearia, glabra, acuta, firma, graminoidia, 6-9 poll. longa, 1½-2 lin. lata. Caulis simplex, teres, semipedalis vel pedalis, foliis 2-3 valde reductis instructus, apice uniflorus vel laxe biflorus. Spathæ valva exterior lanceolata, viridis, acuta, 12-21 lin. longa; interior minor, inclusa, occulta. Perianthium tubus bipollicaris, apice late infundibularis, deorsum cylindricus; limbus pollicaris, rubellus, segmentis oblongis, subacutis, ascendentibus, inæqualibus. Stamina supra medium tubi inserta, filamentis arcuatis filiformibus 5-6 lin. longis, antheris linearibus filamento brevioribus. Stylus arcuatus, stamina superans, stigmatibus tribus oblanceolatis falcatis. *C. B. Spei, in ditione Somerset*, Bowker! Like *M. capensis* (*Tritonia*, Gawl.), his has the perianth of *Montbretia*, in combination with the large entire spathe-valves of *Acidanthera*.

M. STRIATA, *Baker*.—Bulbum non vidi. Folia basalia 4-5, teretia, striata, glabra, 12-16 poll. longa, 1 lin. crassa. Caulis 6-9 pollicaris, teres, simplex vel furcatus, folio unico reducto instructus. Spica laxissima, disticha, 2-4-flora. Spathæ valvæ oblongæ, 3-4 lin. longæ, apice dentatæ, sphacelatæ. Perianthii tubus 12-15 lin. longus, deorsum cylindricus, sursum late infundibularis; limbus albus, purpureo-venosus, 8-9 lin. longus, segmentis oblongis obtusis ascendentibus. Antheræ 4 lin. longæ, filamento breviores. Stylus limbo subæquilongus, stigmatibus tribus patulis. *C. B. Spei*, Masson! Oldenburg! (Herb. Mus. Brit.). This is the plant named in manuscript by Solander *Gladiolus striatus*. It comes near *M. capensis*, differing by its terete leaves and short, truncate, sphacelate-dentate spathe-valves.

TRITONIA BOLUSII, *Baker*.—Bulbus globosus, 5-6 lin. crassus, tunicis fibroso-reticulatis. Folia basalia 5-6, linearia, graminoidea, glabra, acuta, flabellata, 3-4 poll. longa, 2 lin. lata. Caulis teres, flexuosus, gracilis, 2-3 pollicaris, simplex vel profunde furcatus. Flores 6-10, laxe spicati. Spatha valva exterior oblonga, scariosa, brunnea, tricuspidata, 3 lin. longa. Perianthii tubus 4-5 lin. longus, apice obconicus; limbus purpureus, 5-6 lin. longus, erectus, segmentis oblongis subæqualibus. Stamina limbo duplo breviora, antheris luteis 2 lin. longis. *C. B. Spei*, Zeyher! *in campis graminosis prope Uitenhage*, Bolus, 1883! Closely allied to *T. crocata*, var. *purpurea*, but the flower much smaller, with the tube less decidedly obconic at the top.

ANOMATHECA ANGOLENSIS, *Baker*.—Bulbum non vidi. Folia basalia linearia, graminoidea, glabra, acuminata, subpedalia, 3 lin. lata. Caulis gracilis, semipedalis, angulatus, foliis paucis reductis præditus. Spica laxa, triflora, æquilateralis. Spathæ valvæ lineares, acuminatæ, virides, integræ, 18-21 lin. longæ. Perianthii albi tubus tripollicaris apice 1 lin. crassus; limbus pollicaris, segmentis oblanceolatis subæqualibus ascendentibus. Stamina limbo multo breviora, antheris angustis contiguis purpureis 4 lin. longis. Stylus antheras superans, ramis brevibus subulatis divaricatis. Cultivated at Kew in July, 1872, from Angolan bulbs sent by Mr. Monteiro. In general habit it closely resembles the Abyssinian *Acidanthera unicolor* of Hochstetter.

A. GRANDIFLORA, *Baker*.—Bulbus ovoideus, 5-6 lin. crassus, tunicis subtiliter fibroso-reticulatis. Folia radicalia plura, flabellata, glabra, graminoidea, acuminata, pedalia et ultra, 3-4 lin. lata. Caulis gracilis, teres, subpedalis, simplex vel furcatus, foliis paucis reductis præditus. Spica laxa, secunda, 2-10-flora. Spathæ valvæ lanceolatæ virides integræ acutæ, 6-12 lin. longæ. Perianthium rubrum, 12-15 lin. longum; limbus pollicaris, segmentis oblongis obtusis subæqualibus, inferioribus magis patulis fauce maculatis. Stamina perianthio æquilonga, filamentis filiformibus parallelis, antheris angustis 4 lin. longis basi profunde sagittatis. Styli rami gracillimi divaricati. *Montes Manganja*, Dr. Meller! *Ad oram fluminis Luabo*, Dr. Kirk! Near the Natal *A. cruenta*, Lindl., Bot. Reg., t. 1639.

LAPEYROUSIA DIVARICATA, *Baker*.—Bulbum non vidi. Caules robusti, ancipiti, e basi ramosi, ramis elongatis arcuatis. Folia glabra, graminoidea, linearia, infimum 6-8 poll. longum, superiora sensim minora. Inflorescentia copiose corymboso-paniculata, ramis apice bilateraliter spicatis. Spathæ valva exterior viridis, oblonga, cuspidata, 3-4 lin. longa, apice recurvata; interior minor, magis membranacea. Perianthii tubus spatha æquilongus; limbus lilacinus, 3-4 lin. longus, segmentis subæqualibus oblanceolatis. Stamina contigua, limbo duplo breviora. Capsula oblonga vel subglobosa, 2-3 lin. longa. *C. B. Spei in ditione Tulbagh*, Dr. Thom! General habit like that of *L. Fabricii*, Ker, but the tube scarcely protruded from the spathe-valves.

L. Bainesii, *Baker*.—Bulbum non vidi. Caulis bipedalis, anceps, superne copiose ramosus. Folia plura, superposita, anguste linearia, glabra, conspicue multinervata, inferiora pedalia et ultra, 3-4 lin. lata, erecto-patentia, acuminata. Flores in paniculam corymbosam obverse deltoideam 5-6 poll. longam et latam, ramis acute angulatis, dispositi. Spathæ valvæ lanceolatæ, acutæ, 3-4 lin. longæ, dorso viridulæ, apice et margine membranaceæ. Perianthii tubus filiformis, 18-20 lin. longus; limbus albidus, 5-6 lin. longus, segmentis oblanceolatis. Stamina secunda, contigua, limbo paulo breviora. *Africa australis subtropicalis inter Koobie et N. Shaw valley*, Baines! *Transvaal*, Todd! and a variety with a shorter tube, and flowers either whitish or bright lilac, gathered in the Transvaal territory by Messrs. Sanderson and Todd. A very distinct species, near *L. anceps* and *Fabricii*.

L. macrochlamys, *Baker*.—Bulbum non vidi. Caules 3-4 poll longi, subteretes, copiose ramosi, ramis erecto-patentibus. Folia linearia, crassa, dura, margine crispata, inferiora 3-4 poll. longa, 3 lin. lata. Rami floriferi pauciflori, laxe spicati. Spathæ valvæ oblongo-lanceolatæ, naviculares, scariosæ, striatæ, subæquales, 18-21 lin. longæ, apice cucullatæ. Perianthii tubus spatha subæquilongus; limbus semipollicaris, segmentis subæquilibus oblanceolatis. *C. B. Spei*, Forsyth in Herb. Bentham! A very distinct species, remarkable for its dwarf habit and very large striated scariose spathe-valves. I have seen only a single specimen without a note of its special locality.

Acidanthera brachystachys, *Baker*.—Bulbum non vidi. Folia 5 6, congesta, crassa, dura, subteretia, erecta, pedalia, basi 1 lin. crassa, profunde crebre striata. Caulis subnullus. Flores 5-6 in spicam simplicem conferti. Spathæ valvæ lanceolatæ, firmæ, virides integræ, acutæ, 15-18 lin. longæ. Perianthii tubus 3-3½-pollicaris, ad faucem gracilis, cylindricus; limbus 8-9 lin. longus, albido-purpureus, segmentis subæqualibus anguste oblanceolatis, mucronatis, 1 lin. latis. Stamina perianthio duplo breviora, filamentis filiformibus, antheris 2 lin. longis. Stylus perianthio duplo brevior, stigmatibus integris oblanceolatis. *C. B. Spei in ditione Clanwilliam*, Mader! (MacOwan, 2183). Connects *Acidanthera* with *Babiana* through *B. tubiflora*.

A. graminifolia, *Baker*.—Bulbus globosus, 1 poll. crassus, tunicis fibrosis supra collum in setas productis. Folia subbasalia 2, linearia, glabra, graminoidea, 8-9 poll. longa, 3-4 lin. lata. Caulis subpedalis, foliis 2-3 reductis instructus. Spica laxe biflora. Spathæ valva exterior lanceolata, integra, acuta, bipollicaris. Perianthii tubus tripollicaris, purpureo tinctus; limbi segmentis albo-purpureis oblanceolato-spathulatis 9-12 lin. longis, 1¼ lin. latis. Stamina limbo duplo breviora, antheris 4 lin. longis. *C. B. Spei in campis inter Gauritz et Zwellendam*, Bowie! (Herb. Mus. Brit.).

A. PLATYPETALA, *Baker*.—Bulbum non vidi. Folia pauca, distantia, superposita; basalia haud producta; caulina anguste linearia, 3-12 poll. longa, 1½ lin. lata, glabra, acuminata, costa et marginibus incrassatis stramineis. Caulis gracilis, 1-1½-pedalis, strictus, profunde sulcatus, apice 1-2-florus. Spathæ valvæ lanceolatæ, acutæ, virides, subæquales, 18-21 lin. longæ. Perianthii tubus cernuus, 3-3½-pollicaris, cylindricus, apice 1½ lin. crassus; limbi segmenta oblonga, acuta, subæqualia, 9-12 lin. longa, medio 5-6 lin. lata. Stamina limbo duplo breviora. *Natalia*, Gerrard, 547! Sanderson, 16! 265!

A. HUTTONI *Baker*.—Bulbum non vidi. Folia superposita, linearia, glabra, graminoidea, acuminata, 3-4 lin. lata, inferiora pedalia et ultra. Caulis semipedalis vel pedalis, foliis paucis præditus, supremis 3-4 poll. longis. Spica laxe 3-4-flora. Spathæ valvæ valde inæquales, exterior lanceolata, viridis, 1-1½ poll. longa. Perianthii tubus gracilis 1-1½-pollicaris; limbus erectus, roseus, infundibularis, segmentis oblongis, obtusis, subæqualibus, 3-4 lin. latis. Stamina limbo duplo breviora, antheris 4 lin. longis. *C. B. Spei in ditione orientali ad montem Katberg*, Hutton!

A. BREVICOLLIS, *Baker*.—Bulbus globosus, 8-9 lin. crassus, tunicis pluribus brunneis membranaceis. Folia basalia 3-4, anguste linearia, pedalia vel sesquipedalia, erecta, stricta, crassa, plana, 1½-2 lin. lata. Caulis semipedalis, foliis 1-2 reductis præditus. Spica flexuosa, laxe 3-5-flora. Spathæ valvæ oblongæ, obtusæ, firmæ, virides, 9-15 lin. longæ. Perianthii tubus cylindricus, rectus, 6-9 lin. longus; limbus purpureo-lilacinus, segmentis oblongo-spathulatis ascendentibus tubo æquilongis. Stamina limbo duplo breviora, antheris 3 lin. longis. *C. B. Spei*, Cooper, 3197! *Natalia*, Gueinzius! *In arenosis ad ostium fluminis Vischrivier*, MacOwan, 1890!

A NEW CHINESE *ARUNDINARIA*.

By H. F. HANCE, PH.D.

ARUNDINARIA FLEXUOSA, *sp. nov.*—Rhizomate abbreviato pallido fibras radicales crassas emittente, culmis basi squamis pluribus arcte imbricatis pallide stramineis glaberrimis obtusis cinctis 1-1½ pedalibus tenuissimis viridulis glaberrimis vaginis scariosis striatis præter margines densissime ciliatas glaberrimis apice laminam foliaceam deminutam gerentibus tectis ad nodos hinc inde ramulos 1-2 apice 2-3 foliatos aliumque floriferum proferentibus, foliis oblongo-lanceolatis acutis 2¼ poll. longis 5 lin. latis glaberrimis marginibus scabro-denticulatis supra levibus sublucidis subtus pallidis venulisque transversis subtiliter sed conspicue tessellatis, vaginis truncatis apice setoso-fimbriatis, spiculis 1-6 terminalibus simpliciter racemosis pedunculatis linearibus lateraliter compressis 1½-3 pollicaribus 10-14 floris, glumis lanceolatis fortiter nervosis acutis superne hirto-ciliatis inferiore 2-2½ superiore 3 lin. longa, rachilla eximie flexuosa capillari tenuiter hirtella, flosculis distichis summo tabescente sæpius etiam

infimo prorsus castrato glumella inferiore glumis omnino simili tantum instructo superiore deficiente 5 lin. longis 2 lin. inter se distantibus rhachillæ geniculo incrassato insidentibus, glumella inferiore rigida lanceolata mucronata 7-9 nervi præter marginem tenuiter ciliatam glaberrima dorso plana, superiore vix breviore cymbiformi pilosula dorso convexo profunde sulcata bicarinata carinis dense longeque ciliatis rachillæ anfractibus aptata eique stricte adpressa, staminibus inclusis, lodiculis 3 hyalinis lanceolatis inæqualibus longe ciliatis ovarium æquantibus, stylo ad basin fere trifido.

In insula Danorum, Whampoæ, exeunte Maio 1876, detexit Rev. J. C. Nevin. (Herb. propr. n. 19336.)

This very distinct and remarkable species is intermediate between the two sections established by General Munro, the floriferous culms being neither entirely separate from the foliiferous ones, nor the branches bearing both leaves and flowers, but the respective branches being distinct on the same culm. The frequent (which in this case is more instructive and of greater value than would be the invariable) presence of a barren floret at the base of the spikelet completely bridges over the interval between *Arundinaria* and *Arthrostylidium* which, as I long ago remarked,* cannot naturally be kept apart; and the Whampoa plant, judging from Ruprecht's figure of the spikelet, † resembles in the flexuose rachis and distant florets *Arthrostylidium pubescens*, Rupr., much more than any hitherto described *Arundinaria*. As General Munro observes, ‡ there are some *Arundinariæ* (ex gr. *A. amplissima*, N. ab E.) with deciduous florets; but, even were this not the case, the occurrence of continuous and fragile spikelets in *Hordeum* and *Elymus*, genera belonging to the most nearly allied tribe, would greatly weaken the value of this character. If, indeed, "the lower barren flower, with only one palea, kept *Arthrostylidium* well distinct"—an opinion in which I by no means concur, for there are instances of *Arundinariæ* with a male lower floret, which is a half approach to the normal condition in the former genus—that distinction is obliterated by the discovery of the Grass now described. And, as there are several undoubted species of *Arundinaria* natives of Brazil, no stress can be laid on geographical distribution as a ground for separation. As to *Aulonemia*, a reference to Goudot's detailed description and beautiful plate § will show that its lax divaricate panicle is the only character by which it can be distinguished from the ordinary *Arthrostylidia*; and such genera as *Eragrostis*, *Panicum*, &c., contain species infinitely more unlike each other in their inflorescence.

SUCCINCT NOTES ON THE AFFINITY OF THE *PLANTAGINEÆ*.

BY BARON FERD. VON MUELLER, C.M.G., M.D., PhD., F.R.S.

THE small Order of *Plantagineæ*, through represented in nearly all zones of the inhabitable part of the globe, does not as yet occupy a finally recognised place in systematic arrangements. Nor in the recently completed second volume of Bentham and Hooker's "Genera" has this group of plants obtained a firmer standing in the ordinal series, while innumerable new observations on the limits of Genera and Orders, as well as on their mutual relation, stamp that great work as one of the most important and original that has appeared in this century. It may, therefore, not be out of place to offer my own views on the alliance of these plants, especially as they are left by Bentham and Hooker more isolated than before It must, however, be apparent to any observer who has had to deal with new genera or to place old ones in more proper positions (and thereby to aid in circumscribing more distinctly the limits of the Families of plants), that only when the whole vegetation of every country shall have become known, an ultimately settled place can be assigned to any group of plants even in a linear arrangement. The discovery of new forms of vegetable life in many yet untrodden parts of the globe may yet shed additional light on the true affinity of the Order alluded to on this occasion. So far as the literature is accessible here to me, I find that Adanson placed the *Plantagineæ* (and this not without some reason) among his *Jasmineæ;* Jussieu and also De Candolle brought them next to *Plumbagineæ*, *Nyctagineæ*, and *Amarantaceæ*, and in this they are almost followed by R. Brown; Bartling arranged them with *Globularieæ* besides; D. Don well pointed out the affinity to *Primulaceæ*, in which view Lindley concurred; Al. Braun and Hanstein inserted them between *Selagineæ* and *Verbenaceæ;* Grisebach put them near *Campanulaceæ* and *Plumbagineæ;* J. Agardh has them close to the last-mentioned Order and *Jasmineæ;* Martius inserted them next to *Hydrophylleæ* and *Convolvulaceæ;* Miquel found a place for them betwixt *Labiatæ* and *Scrophularinæ;* Walpers interpolates them between *Salvadoraceæ* and *Plumbagineæ;* Meisner ranges them with *Plumbagineæ* and *Salvadoraceæ;* Asa Gray left them between *Styraceæ* and *Primulaceæ;* Le Maout and Decaisne assigned to them a seat between *Nyctagineæ* and *Labiatæ;* Reichenbach simply included them once in *Primulaceæ;* Brongniart placed them in close vicinity to *Verbenaceæ;* and Cosson and Germain arranged them between *Primulaceæ* and *Ilicineæ*. In reviewing the whole of these inconsonant opinions, it may be affirmed that the affinity of the *Plantagineæ* to the *Primulaceæ* only is safely established, while the links which connect them in other directions with the great chains of affinities have either been lost or have never been recognised.

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* Ann. sc. nat. 4e sér. xviii., 235.

† Ruprecht, Bambuseæ, t. iv, f. 14.

‡ Monogr. Bambus. 39.

§ Ann. sc. nat. 3e sér. v. 76, t. 4.

Having had many opportunities of giving consideration to the systematic positions of such Orders as are represented in Australia, it has occurred to me that the *Plantagineæ* might with advantage be placed in proximity to the Loganiaceous plants, although this would indicate only one of the threads by which they are connected with other ordinal groups. To vindicate this proposition, I would point to the conformity of some of the genera of the two Orders in respect to division and æstivation of both calyx and corolla, the number and insertion of the stamens, the position and dehiscence of the anthers, the two-celled ovary, the simple style, the axillary placentæ, the fleshy albuminous seeds, the straight embryo, and the inferior radicle. What led me first to trace out this mutual relation was the form and peltate attachment of the seeds, which are of the greatest similarity in *Plantago* and *Logania*, although I have not found the testa mucous in species of the latter genus. But the mucilaginous testa is not even of generic value for discrimination in other Orders, as researches on *Erysimum*, *Lepidium*, *Pyrus*, and other genera have clearly demonstrated; and this character is also only one of degree among the various species of *Plantago*. The habit of *Plantagineæ*, it must be admitted, is not repeated among any Loganiaceous genera hitherto known, however great even the external dissimilarity among *Loganiaceæ* themselves; but outer appearances separate even many species of *Plantago* widely from each other, while *Littorella* stands as much by itself in habit as *Limosella* does among *Scrophularinæ*. The circumscission of the capsule, though universal in the great typical genus *Plantago*, is neither in this or any other Order of more than generic importance. Opposite leaves, necessary in true *Loganiaceæ*, are rare in *Plantagineæ*, but do occur. The strong longitudinal nerves of the leaves which many species of *Plantago* exhibit remind us of those of *Strychnos*, and particularly of many plants of the closely allied *Gentianeæ*. The placentation, however, affords a strong mark of distinction between *Loganiaceæ* and *Plantagineæ*. The placenta of *Plantago*, often free in the ripe fruit, gives grounds for recognising a relationship to *Primulaceæ*, the seeds of which are also frequently peltate. The alliance to *Plumbagineæ*, so frequently insisted on, is obscure; indeed, it appears to me that this family might readily be transferred to near the *Curvembryonatæ*, which again form the best transit from *Thalamifloræ* to *Calycifloræ*, whether mono- or dichlamydeous, the Plumbagineous plants being moreover mostly dialypetalous. And finally, it may be added that really no difficulty exists to dispose of all the real *Monochlamydeæ* (*Coniferæ* and *Cycadeæ* considered achlamydeous) among the *Thalamifloræ* and *Calycifloræ*, especially since the discovery of the genus *Buckleya* seems to have proved the floral envelope of *Proteaceæ* and *Santalaceæ* to be petaline and analogous to that of *Loranthaceæ*. This view, furthermore, seems confirmed or strengthened by the articulation of the petals of many *Proteaceæ* with the pedicel, the real calyx thus being obliterated, as in *Diplolæna* and *Asterolasia* among *Rutaceæ*, not to allude to some similar instances in several other Natural Orders.

Melbourne, 24th July, 1876.

ON A SECOND COLLECTION OF FERNS MADE IN SAMOA BY THE REV. S. J. WHITMEE.

By J. G. Baker, F.L.S.

At page 9 of the present volume of the Journal I gave an account of a collection of Ferns made in Samoa by the Rev. S. J. Whitmee, of the London Missionary Society. This summer he has sent a considerable supplement, the additional species in which are as follows. As before, the numbers in brackets indicate the position of the novelties in the series followed in Hooker and Baker's Synopsis, and those not in brackets are those under which Mr. Whitmee sends the plant, which I preserve because he intends to employ them in a distribution and use them for after-reference.

199 ex parte (52*). Cyathea Whitmeei, *Baker*, n. sp. Frond ample, tripinnate. Rachises pale brown, unarmed and quite naked. Pinnæ oblong-lanceolate, 1½-2 feet long, 8-10 inches broad. Pinnules sessile, lanceolate, cut down to the rachis into ligulate deeply inciso-crenate tertiary segments ⅙ inch broad. Veinlets 10-12-jugate, erecto-patent, deeply forked. Texture membranous; both surfaces naked except numerous small pale bullate scales scattered on the under side. Sori medial, 8-10 to a pinna. Involucre large, pale, campanulate, persistent, the mouth nearly entire. Involucre and bullate scales like those of *C. leucolepis*, but the texture of the frond different, and the tertiary segments much smaller and deeply inciso-crenate.

199 ex parte (52*). Cyathea scabra, *Baker*, n. sp. Frond ample, tripinnate. Rachises castaneous, glabrous, scaleless, scabrous with dense raised points. Pinnæ oblong-lanceolate, 1½-2 feet long, 8-10 inches broad. Pinnules sessile, lanceolate, ¾-1 inch broad, cut down to the rachis into ligulate deeply crenate tertiary segments ⅛ inch broad. Veinlets 10-15-jugate, deeply forked, erecto-patent, distinct. Texture moderately firm; both surfaces and rachises nearly free from hairs or scales. Sori 10-16 to a segment, ultimately filling the whole surface except the tip. Involucre large, membranous, breaking up irregularly.

22. Hymenophyllum Tunbridgense, *Sm.*
13. polyanthos, *Sw.*
30. Trichomanes pallidum, *Blume.*
17. muscoides, *Sw.*
7. Dicksonia Brackenridgei, *Mett.*
208. moluccana, *Blume.*
200. straminea, *Lab.*
217. Davallia plumosa, *Baker.* This time in fruit, which was previously unknown. The involucres are of the Eudavallia type, cylindrical, quite immersed and not very close to one another.
36. Davallia botrychioides, *Brack.*
35. pectinata, *Smith.*
47. tenuifolia, *Smith.*
226. elata, *Sw.*
229. repens, *Desv.*
9. moluccana, *Blume.*
227. Lindsaya lobata, *Poir.*
54. Adiantum diaphanum, *Blume.*
180. Pteris patens, *Hook.* This is wrongly placed under *Campteria* in the "Synopsis." It really belongs to the section *Eupteris.*
179. Pteris Wallichiana, *Agardh.* New to Polynesia.
178. incisa, *Thunb.*
181. Lomaria lanceolata, *Spreng.*
148. procera, *Spreng.*
68. Blechnum orientale, *Linn.*
76. Asplenium tenerum, *Forst.*
183. laserpitiifolium, *Lam.*
213 (199*). (Athyrium) oosorum, *Baker*, n. sp. Fronds ample,

quadripinnatifid. Rachises naked, glossy, pale brown. Pinnæ oblong-lanceolate, reaching a length of $1\frac{1}{2}$-2 feet and a breadth of 8-10 inches. Pinnules lanceolate, 12-15 lines broad, cut down to a narrow wing into deeply pinnatifid spaced lanceolate tertiary segments $\frac{1}{4}$ inch broad. Veins sparingly pinnate in the quaternary lobes. Texture moderately firm; both surfaces quite naked. Sori oblong, subcostal, half a line long, usually one only at the base of each quaternary segment. Involucre firm, persistent, glabrous. Like the Philippine *A. woodwardioides*, Baker, in sori and texture, but the lamina much larger and more compound.

88. Asplenium (Diplazium) maximum, *D. Don.*
184. Allantodia Brunoniana, *Wall.*
203. Aspidium aculeatum, *Sw.*
224. var. samoense, *Luerssen.*
201. Nephrodium hirtipes, *Hook* New to Polynesia.

202 (17*). (Lastrea) PUBIRACHIS, *Baker*, n. sp. Caudex erect. Stems densely tufted, pilose, clothed, especially in the lower half, with many large lanceolate pale brown membranous scales. Frond oblong-lanceolate, bipinnate, 8-10 inches long by 4-5 inches broad, not reduced at the base. Pinnæ lanceolate, 2-$2\frac{1}{2}$ inches long, $\frac{1}{2}$-$\frac{5}{8}$ inch broad, sessile, cut down to the rachis into close ligulate sub-entire or toothed obtuse segments under $\frac{1}{8}$ inch broad, the lowest pair of pinnæ much deflexed. Texture moderately firm, the rachises pilose and rest of the surfaces naked. Sori copious, medial. Veins simple, 6-8-jugate. Involucre firm, persistent, glabrous. Closely allied to *N. chrysolobum* of Tropical America.

50. Nephrodium davallioides. *Baker.*
212. pteroides, *J. Sm.*
211. Haenkeanum, *Presl.?* Small variety.

204 (50*). POLYPODIUM (Phegopteris) PERSIMILE, *Baker.* Frond ample, bipinnate. Rachises stramineous, finely pubescent. Pinnæ oblong-lanceolate, reaching a foot long, 3-4 inches broad. Pinnules lanceolate, sessile, cut down to the rachis into close ligulate obtuse tertiary segments $\frac{1}{8}$ inch broad. Veins pinnate in the tertiary segments, with many erecto-patent forked veinlets. Texture membranous; both surfaces bright green, finely pilose. Sori small, round, placed nearer the edge than the midrib, many to each tertiary segment. Texture and cutting very like those of *Nephrodium Boryanum.*

222 (103*). POLYPODIUM (Eupolypodium) SAVAIENSE, *Powell in litt.*, n. sp. Caudex erect. Stems tufted, an inch long, clothed with soft short spreading brown hairs. Frond ligulate, entire, 5-6 inches long, under half an inch broad, narrowed gradually from the middle to both ends. Texture membranous; surfaces slightly hairy. Veins distinct, erecto-patent, the central ones with 2-3 ascending branches on each side, which fall short of the edge and end in sori. Sori minute, round, superficial, irregularly biserial, none near the midrib, but all medial and intramarginal. Sent also by Mr. Powell a few months ago under the name which I have adopted.

185. Polypodium cucullatum, *Nees*. A very large robust variety.

223 (130*). POLYPODIUM (Eupolypodium) DELTOIDEOPHYLLUM, *Baker*, n. sp. Caudex erect. Scales dense, linear, acuminate, membranous, pale brown. Stipe scarcely any. Frond lanceolate, 6-10 inches long, ½-⅝ inch broad, narrowed gradually to both ends, cut down nearly to the rachis, the central lobes oblique, deltoid, obtuse, ⅙-¼ inch broad at the base, many lower ones confluent in a mere narrow crenate wing to the rachis. Texture subcoriaceous; both surfaces furnished with a few short inconspicuous brown hairs. Veins pinnate in the primary lobes, with many erecto-patent ascending simple parallel veinlets on each side, which fall short of the margin. Sori minute, round, immersed, terminal on the veinlets, 4-6 to each central pinna. Near the East Indian *P. khasyanum* and West Indian *P. inæquale*.

128. Polypodium blechnoides, *Hook.*
130. decorum, *Brack.*
189. diversifolium, *Swartz.*
140. Gymnogramma calomelanos, *Kaulf.*
187, 188. caudiformis, *Hook.*
150. Acrostichum sorbifolium, *L.*
190. aureum, *L.*
198. Todea Wilkesiana, *Brack.*
194. Ophioglossum reticulatum, *L.*
192. pendulum, *L.*
197. Botrychium daucifolium, *Wall.*
173. Lycopodium clavatum, *Linn.*
176. squarrosum, *Forst.*
No number. verticillatum, *L.*
" aqualupianum, *Spring.*
171. cernuum, *L.*
167. Phlegmaria, *L.*
169. macrostachys, *H. & G.*
218. Psilotum triquetrum, *Sw.*
33. Tmesipteris Forsteri, *Endlich.*

SHORT NOTES.

DIATOMS AND WHEAT-STRAW.—At p. 212 attention was drawn to the extraordinary statements of Mr. P. B. Wilson in Silliman's Journal for May last. The well-known high scientific character of the periodical in which the article appeared seemed to forbid any point blank denial of the apparent *facts* as stated by the observer, though we thought it necessary to state distinctly that the inferences drawn as to the mode by which the Diatoms reached the surface of the stem must necessarily be erroneous. We have since seen a rough plate in the "Quarterly Journal of Science" for July (reproduced in the "Monthly Microscopical Journal" for September) representing the "forms of Diatoms found" in the straw. A glance at this is sufficient to show the utter absurdity of the whole affair; it is only necessary to say that of the figures which can be identified, some certainly represent portions of the epidermis, one is a Foraminifer, and another a Sponge-spicule! The whole is utterly untrustworthy. It scarcely, however, required such a barefaced imposition as this plate to discredit the observations, if what is stated in the "American Journal of Microscopy" for August is to be believed, *i.e.*, that the whole thing was an advertisement got up by dealers in artificial manure, and that translated it reads thus: "If you want good crops buy our finely-divided silica." In a well-timed article in the last-mentioned journal, in which it is shown that only one of the Diatoms figured belongs to the exclusively marine deposit with which the field was manured, the author expresses the regret of Americans that the foremost scientific journal of the country "should have lent its aid to the propagation of such nonsense."

HOLOTHRIX VATKEANA; ultra pedalis, gracilis, tuberidiis oblongo-ovoideis, foliis geminis hemistratis a basi rotundata oblongis acutis, racemo sparsifloro plurifloro quaqueverso, bracteis triangulo-semilanceis, perigonio conniventi, sepalis triangulis, tepalis ligulatis porrectis plus duplo longioribus, labello ad medium trifido laciniis linearibus, calcari conico amplo apice gracili incurvo, ovarium dimidium vix æquante. Folia, pedunculum, bracteæ, ovaria pilosa, perigonia calva.—This is the tallest of all now known species of the genus, growing more than a foot long. The leaves nearly cover a shilling-piece. The flowers are twice as great as that of its nearest ally, *Holothrix gracilis*, Lindl., which has a different spur, thick leaves, etc. It grows in Somali Land, at Meod, in the territory of Serrut, at an elevation of 1800 ft., on limestone, under shrubs (Hildebrandt, no. 1465). It is a pleasure to me to dedicate this species to Dr. Vatke, of Berlin, a most ardent botanist.—H. G. REICHENBACH FIL.

ISNARDIA PALUSTRIS, *Linn.*—With regard to Mr. J. C. Melvill's note in last month's "Journal of Botany" (p. 309), I may say that in August, 1874, I very carefully searched the Brockenhurst station without finding the plant. In 1873 Mr. Beeby and myself did the same at Petersfield Heath, but unsuccessfully. Mr. W. W. Reeves for several years has looked for it at Buxted without success, but has what he thinks may be a very small specimen without flower or fruit, gathered from there within the last year or so. In July, 1874, Dr. F. A. Lees gathered a few specimens in St. Peter's Marsh, Jersey. There is yet another station mentioned by Dr. Bromfield in the old series of the "Phytologist," vol. iii., p. 1098, in a foot-note to *Leersia oryzoides*, in which he describes it as trailing on the damp soil, flowering and fruiting freely in plenty, with *Peplis Portula* and *Helosciadium inundatum*. This station I also carefully looked for in 1874, and here I think the plant may again be found, but it has probably not been gathered since August 23, 1849.—A. BENNETT.

CROCUS NUDIFLORUS.—The enclosed specimen was gathered on the 7th October in a hilly pasture-field just below Wolstanton Church, about a mile from Newcastle-under-Lyme. At Michaelmas there was no appearance of the plant; the growth must be very rapid, as by the 4th October it had sprung up plentifully. Some of the bulbs flower again in spring. It has existed in the locality above-mentioned for a century in plenty. It is recorded in Purton's "Midland Flora," as growing at Strut End; of this locality I know nothing, but before railway days it existed in another neighbouring locality now destroyed. I have also heard on good authority of one other spot in North Staffordshire where this plant grows or did grow. —ELIZABETH EDWARDS.

Notices of Books.

Dictionnaire de Botanique. Par H. BAILLON, &c. Premier fascicule. Paris: Hachette et Cie. 1876. [London: Dulau and Co.] 4to. (Pp. 80.)

A SINGLE fascicle only of this new dictionary of botany has as yet come to hand. It consists of eighty large quarto pages beautifully printed in double columns on thick paper, with the text liberally illustrated with excellent woodcuts and a full quarto coloured plate. The price of the part is 5 francs. As the vocabulary extends only to the word "Aile" in this first fascicle, it may be estimated that between thirty and forty similar ones will be requisite to get through the alphabet, and that the whole book will be necessarily in three or four volumes.

This is an extensive undertaking, and in it Prof. Baillon is assisted by several botanists in their special departments; among others by MM. de Seynes, Nylander, Fournier, Bureau, Weddell, &c. With such names on the title-page it is scarcely necessary to say that the work is thoroughly well done. The dictionary is planned on a most comprehensive scale, and is incomparably fuller than any other book of the sort now existing. One naturally compares it with our own excellent "Treasury of Botany," and the much greater extent of the vocabulary of the French list is shown by comparing the number of words commencing with AB, which are 129 in it, whilst the former book has but 39. This results from the scheme including, besides the scientific names, numerous synonyms, a large collection of native names, of botanical terms, the names of botanists, and indeed of words relating to all departments of the science.

So far as yet examined, the treatment of each word is well planned. One great advantage (the want of which is much felt in the English book above mentioned) is that a copious bibliography and full references to original sources of information are supplied. We also find the derivation of the names given. In some cases the treatment of a word is very extended; thus under "absorption" we have an article of eleven columns, and that on "accroisement" extends to ten columns. The illustrative woodcuts are in M. Faguet's usual excellent style; a good number of them have been used in the published parts of Baillon's "Histoire des Plantes," but there are very many new ones.

There can be no hesitation in heartily recommending this new and very full botanical *thesaurus*, which cannot fail to be of the greatest use to botanists of all kinds. The only thing which may be considered a fault is that the national failing for giving the French names of genera precedence over the Latin ones has rendered cross-references frequently necessary. No non-French botanist would know that the genus *Homalium* was to be found under "*Acomas*," or would at first look for *Apium* under "*Ache*." It is a pity that a new dictionary did not break off this traditional custom which has prevailed from the time of Lamarck's great encyclopedic work. But in spite of this, there can be no doubt that the present "Dictionnaire" supplies a widely felt necessity in a most satisfactory manner, and should have a place in the library of all who study the science to which it is devoted. H. T.

Repertorium annuum Literaturæ Botanicæ Periodicæ. Curarunt G. C. W. Bohnensieg et W. Bruck. Tom. 2, 1873. Haarlem, 1876 (8vo, pp. 200).

The publication of the first instalment of this useful serial, containing the literature of 1872, was noticed (Journ. Bot., 1874, p. 121) in some detail. The long delay in the issue of this second volume has been caused by the death of Mr. Van Bemmelen, the compiler of the first. He is succeeded in the keepership of the Teylerian Society's Library by Mr. Bohnensieg, who has decided to continue the annual publication, and now issues the volume for 1873, promising that for 1874 before the end of the year.

The number of periodicals consulted is, it is satisfactory to see, very largely augmented, 149 being enumerated against 93 in the previous volume. But there are still some omissions which it would be easy to supply. Of British periodicals, the "Annals and Magazine of Natural History," the "Pharmaceutical Journal," and the "Gardeners' Chronicle" (though a newspaper) should be included, and there is still a very imperfect record of Scandinavian literature—the Copenhagen "Botanisk Tidsskrift" and the Lund "Botaniska Notiser" being still omitted. So far as examined, the record is well and conscientiously compiled, and the classification of the subjects, though somewhat over elaborate, is well considered; probably no system can avoid repetitions. Good indexes to authors' names, and to orders and genera, render it easy to find any item. All who have to consult botanical literature will be glad to have this annual repertory, which it is to be hoped will be published rapidly, so as to overtake the last three years. H. T.

A Plain and Easy Account of British Fungi, with special reference to the Esculent and Economic Species. By M. C. Cooke, M.A., LL.D. Third Edition revised. Hardwicke and Bogue, 1876. (pp. 166.)

It may be assumed as a fact that a book which reaches a third edition has supplied a want. Though the number of those who really study Fungi in this country is very small, there are probably a good many who are glad to know the names of some of the most familiar and striking species, and to learn something of their properties. To such, and to a limited extent, the present little book may prove useful. The author is here on his own special ground, and has had, besides, considerable experience in the compilation of "popular science" writings. Yet it would not be possible to contend that he has done his best in the present case; indeed, instead of an "Account of British Fungi," the main title of the book might be more accurately worded, "Notes on some of the larger British Hymenomycetes, with a selection of approved receipts for cooking the edible species." The time has scarcely yet arrived, if it ever can, for a "plain and easy" account of the structure, development, changes, and genetic relationships of the lower Fungi, but surely somewhat more than twenty-five small pages in large type might have been allotted to the whole of the remaining Families; and Mr. Cooke could readily have afforded his readers more complete information on some of the most interesting and important forms. The text is illustrated by twenty coloured plates, mostly redrawn for this edition and decidedly better than those of the previous ones. H. T.

Proceedings of Societies.

British Association.—*Meeting at Glasgow*, 1876.—There was very little of botanical interest at the meetings of the various sections. The principal papers read were the following:—"On the most recent researches into the structure and affinities of the plants of the coal-measures," by Prof. W. C. Williamson. With regard to *Calamites*, what had formerly been regarded as the stem had turned out to be only casts in sand or mud of the pith of the plant. The author had recently obtained a specimen with the bark on exhibiting the following structure: a cellular pith surrounded by canals running lengthwise down the stem; outside of these canals, wedges of true vascular structure; and, lastly, a cellular bark. Brongniart had placed *Lepidodendron* in a separate group from *Sigillaria*, being under the impression that a layer of exogenous growth characterises *Sigillaria* and is absent in *Lepidodendron*; the author had examined a series of young and old specimens which showed that the differences were not of such importance, but merely specific, or perhaps resulting from the age of the individual plants.—"Notes on Mascarene species of *Pandanus*," by I. B. Balfour. No part of the flora of the Mascarene Islands is more peculiar than the Screw-pines. No less than twenty-two species occur there, of which twenty are endemic; nine at least are endemic to Mauritius, and of the four recorded for Bourbon three are endemic. The definition of the species is very difficult, and a scientific revision of the genus much wanted, the whole being in confusion; the examination of the Mascarene species will greatly contribute towards enabling this to be effected.—"On the circinate vernation of *Sphenopteris affinis*, and the discovery of *Staphylopteris* in British Rocks," by C. W. Peach. The author has examined *S. affinis* in the black shale at West Calder near Edinburgh, in a large series showing completely its vernation from an early stage. He believed that several species had been formed by observers out of these different stages. *Staphylopteris* was found also at West Calder; it is well known as occurring in the carboniferous rocks of Illinois and Arkansas.—Prof. W. R. McNab gave an account of the structure of the leaves of several species of *Abies*. These will be fully illustrated in the "Proceedings" of the Royal Irish Academy.

The meeting was attended by many English botanists, and by Prof. Cohn, of Breslau. and Prof. Morren, of Liége.

THE MEETING OF GERMAN NATURALISTS AT HAMBURG, 1876.*—The meetings of naturalists and medical men held this year at Hamburg were rather well attended by botanists. Among those present may be mentioned:—Ahlborn, Hamburg; Boehm, Vienna; A. Braun, Berlin; Brefeld, Berlin; Brockmüller, Schwerin; Buchenau, Bremen; Buek, Hamburg; Drude, Göttingen; Eichler, Kiel; Eidam, Breslau; Flögel, Bramstedt; G. W. Focke (*Desmideæ*), Bremen; W. O. Focke (*Rubus*), Bremen; Gottsche, Altona; Grönland, Dahme; Hartneck, Potsdam; Hasskarl, Cleve; Hinneberg, Altona; Kienitz-Gerloff, Berlin; Knebel, Breslau; Magnus, Berlin; Prantl, Würzburg; Sadebeck, Hamburg; H. Schröder, Hamburg; Sonder, Hamburg; Sorauer, Proskau; Warming, Copenhagen; Weidemann, Flensburg; Wittmack, Berlin; Zacharias, Strasburg. Messrs. Wahnpheff and Mielik, of Hamburg, were secretaries, and the session was opened on Sept. 18 by Prof. H. G. Reichenbach. The following botanical papers were read at the meetings:—

Sept. 19th.—Prof. Braun in the chair.—Dr. Buek, "On some interesting specimens in his carpological collection."—Dr. Braun, "On the tendrils of *Cucurbitaceæ*."—Dr. Sadebeck, "On some *Saprolegnieæ*."—Dr. Kienitz-Gerloff, "On the genetic connection between Mosses, vascular Cryptogams, and Phanerogams."—Dr. Boehm, "Remarkable absorption of carbonic acid by plants."

Sept. 21st.—Dr. Eichler in the chair.—A congratulatory telegram was addressed to Prof. Roeper, of Rostock, who celebrated on this day the fiftieth anniversary of his appointment as Professor.—Dr. Drude, "On the morphology of the ovules of Palms."—Dr. Braun, "On *Agave*."—Dr. Sorauer, "On a disease of Apple-trees."—Dr. Wittmack, "On period of vegetation of northern cereals."—Dr. Reichenbach, "Contributions to the morphology of Orchid flowers."—Dr. Boehm, "Relationship between the development of roots and retention of leaves."

Sept. 22nd.—Dr. G. W. Focke in the chair.—Dr. Sadebeck, "On Embryology of *Equisetaceæ*."—Dr. Reichenbach, "Metamorphosis of Ferns."—Id., "A remarkable hybrid Campanula from Tirol—*Campanula Haussmanni*"; "Mimicry of Balanophoreæ by young *Conopholis*"; "On Mr. Peacock's Succulents at Hammersmith"; "Notice of Hildebrandt's collections."—Dr. Wahnpheff, "On some rare Mosses of the Hamburg flora."—Dr. Boehm, "On absorption of water by leaves."—Dr. Brefeld, "Fungological remarks, with

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[*] We are indebted to Prof. H. G. Reichenbach, of Hamburg, for this notice. —[*Ed. Journ. Bot.*]

demonstration of preparations."—Dr. Drude, "On questions of botanical nomenclature."—"On *Bacteria* of a red colour."—Dr. Prantl, "On the development of the sporangia in some Ferns, chiefly *Lygodia*."—Dr. Groenland exhibited microscopic preparations, and Dr. Sorauer a new microtome.

The success of the meeting was assured by the presence of Prof. A. Braun, of Berlin, and was greatly contributed to by the perseverance and activity of Dr. Buck, the Nestor of Hamburg botanists.

Botanical News.

ARTICLES IN JOURNALS.—SEPTEMBER.

Journal of the Linnean Society (Sept. 14th, no. 85).—J. G. Baker, "Revision of the genera and species of *Anthericeæ* and *Eriospermeæ*."

American Naturalist.—L. F. Ward, "A new Fir from the Rocky Mountains (*Pinus subalpina*, Engler).

Monthly Microscopical Journal.—W. G. Smith, "Germination of the resting-spores of the Potato-Fungus" (tab. 151-4).

Grevillea.—M. C. Cooke, "New British Fungi."—Id., "Some Indian Fungi" (tab. 74).—Id. and J. B. Ellis, "New-Jersey Fungi." —J. M. Crombie, "New British Lichens."—W. Phillips, "Discomycetes from California."

Œsterr. Bot. Zeitschr.—T. v. Weinzierl, "Distribution of Phloroglucin in the vegetable kingdom."—B. Stein, "Silesian Roses."—W. Voss, "Carinthian Mycology."—H. Kemp, "Notes on Flora of Vienna."—M. Staub, "Flora of the winter 1872-3."—J. A. Krenberger, "Second appendix to Flora of East Waldviertel Raabs and the neighbourhood."—F. Antoine, "Botany at the Vienna Exhibition" (contd.).

Flora.—J. E. Weiss, "On the vascular bundles in *Piperaceæ*" (contd.) (tab. 11, 12).—W. Nylander, "Ramalinæ Cubanæ novæ."—A. de Krempelhuber, "Lichenes Brasilienses" (contd.).—F. de Thuemen, "Fungi austro-africani."

Bot. Zeitung.—H. Hoffmann, "Experiments in cultivation" (contd.).—Vesque-Püttlinger, "On the periodicity of protoplasmic movements."—R. A. Philippi, "On *Fuchsia macrostemon* and its allies."—N. Sorokin, "On *Morchella bispora*" (tab. 10).—C. J. Salomonsen, "On the isolation of different forms of *Bacteria*."

Bull. Bot. Soc. Belgique (tom. xv., pt. 1, Sept. 12th).—L. Piré, "On the Flora of India" (chiefly historical).—F. Crépin, "Primitiæ Monographiæ Rosarum, iv." (American Roses).—O. de Dieudonné (the late), "Monograph of the European species of *Adonis* extracted from an unpublished Flora of Europe."—C. J. Lecoyer, "Note on *Thalictrum*."—C. Baguet, "Material for Flora of Brabant."

New Books.—M. Lamotte, "Prodrome de la Flore du plateau central de la France." Part 1. *Ranunculaceæ—Umbelliferæ*. (Paris, 6s.)—G. G. Gillet, "Les Champignons." Part 2. 48 col. plates. (Paris: 22f. 50c.)

Baron von Mueller has made some progress with the 10th volume of his "Fragmenta Phytographiæ Australiæ," four parts of which are now issued. As the "Flora Australiensis" is so nearly completed, the "Fragmenta" may be regarded now as supplementary to that valuable work. Many new species continue to be added to the Australian list by the investigation of new districts, whilst the more careful examination of others adds many new localities and fuller descriptions of known species. The last published part contains a new genus, *Leichhardtia* (*Menispermeæ*), dedicated to the illustrious and unfortunate explorer of N.E. Australia, Brown's genus of the same name having been reduced to *Marsdenia*. Von Mueller has also contributed to the Royal Society of Tasmania a fourth part of contributions to the phytography of that island, which he visited last year. A number of introduced European plants occur in the list, among others *Anacharis canadensis*, which was first noticed about 1862, and has commenced to spread. A third sheet of the same author's "Descriptive Notes on Papuan Plants" has reached us. The collection was mainly obtained by the Rev. S. Macfarlane, of the London Missionary Society, Mr. Andrew Goldie (collecting for B. S. Williams of London), and Signor d'Albertis. Most are still from the coast regions and of familiar types; greater novelty may be expected when the mountainous districts of the interior has been reached. A remarkable new *Asplenium* (*A. Scolopendropsis*) is described, which renders the union of *Scolopendrium* with *Asplenium* almost necessary.

Prof. Regel's "Descriptiones Plant. nov. et minus cognitarum," fascicle 4 (St. Petersburg, 1876), contains a revision of the genera and species of *Cycadeæ* and of the Russian species of *Euonymus* and *Rhamnus*, besides the usual descriptions of new plants in the St. Petersburg Garden. *Smirnowia* is a new genus of *Leguminosæ*.

M. Micheli, of Geneva, contributes to the Archives of the Academy of that place a review of the principal publications (some sixty-five in number) relating to physiological botany during the year 1875, in continuation of a similar report for the previous year.

Mr. George R. M. Murray has been appointed a Junior Assistant in the Department of Botany, British Museum, having previously had the advantage of studying in the botanical laboratory at Strassburg, under Prof. de Bary.

Mr. John Horne, F.L.S., who has been for some years acting as Director of the Botanic Gardens at Mauritius, has been now formally appointed to that position.

Among the grants for scientific purposes made at the meeting of the British Association, we notice that there is one of £20 to Dr. Hooker for a "report on the Family of the *Dipterocarpeæ*."

The death is recorded, by a fall down a crevasse near Lienz, in Tirol, of Dr. W. Velten, of Vienna, on the 26th August. He has contributed several histological memoirs to the German botanical journals.

The Natural History Library of the late Prof. Brongniart will be sold by auction at Paris on December 4th and following days. The catalogue extends to 230 pages, and the books are well classified under subjects in 2480 lots. It is especially rich in rare *brochures* and pamphlets, and in works on vegetable palæontology.

Original Articles.

NEW PALMS COLLECTED IN THE VALLEY OF THE AMAZON IN NORTH BRAZIL, IN 1874.

By James W. H. Trail, M.A., M.B., F.L.S.

(Tab. 183.)

(*Continued from* p. 333.)

Cocoineæ.

Genus Desmoncus, *Mart.*

14. D. palustris, *sp. n.* (Trail hb. Palm., 81).—Vagina et costæ aculeis rectis nigris ·010^{m}-·025^{m} armatis et tomento albido-badio sparse vestitis; foliis 1·5^{m}-2·0^{m}; *pinnis* 18-*jugis*, lanceolatis, acuminatis, crassiusculis, ·18^{m}-·22^{m} × ·018^{m}-·28^{m}, *supra* ad venam mediam plerumque *aculeis* 4-5, sparsis, nigris, rectis, subtus aculeis 1-2 similibus *armatis*; cirrhi subinermis hamis 8-jugis validis, subulatis; *spatha interiore spathulata*, ·60 , sublignea, extus sparse tomentosa et aculeis nigris ·005^{m}-·010 armata; *spadicis pedunculo* ·60 *aculeis sparsis* iis spathæ similibus *armato*, *ramos* 8-10, ·075^{m}, tenues *emittente*; *fl.* ♀ *corolla* calyce quadruplo longiore, *ore profunde trifide.*

Hab.—In paludibus ad fl. Padauiri, brachium fluminis Negro.

Obs.—This species seems to come very near in some points to *D. horridus* Splitgerber (Palmet. Orbign., p. 51), from which, however, it differs in the characters italicised; possibly it may prove, on comparison of specimens, to be a subspecies of *D. horridus*.

15. D. pumilus, *sp. n.* (Trail hb. Palm., 75).—Caudice 1^{m}-2 × ·005 ; vagina aculeis setiformibus nigris rectis, costæ aculeis nigris aduncis a basi incrassata ortis valide armatis; foliis ·50^{m}, pinnis 4-5- (raro 6-) jugis, lanceolatis, acuminatis, crassiusculis, valide plicatis, ad venam mediam supra aculeis 6-8 rectis, sparsis, nigris, armatis, ·06^{m}-·11^{m} × ·03 ; cirrhi hamis 4-5-jugis subulatis, validis; spathis inermibus, interiore anguste fusiformi, ·25 -·38^{m} × ·012 , interdum aculeolis caducis ad basin sparse armata; spadicis ·25^{m}-·37^{m} rachi filiformi ramos 5 tenues ·037 emittente; fl. ♀ corolla quam calyx duplo longiore trifida; drupa obovata, ·012 × ·009 , aurantiaca; endocarpio nigro. [Tab. 183, fig. iv.]

Hab.—In campis arenosis inter Gramina, Cyperos, et Melastomas adscendens, ad fl. Padauiri, sub Alquatore.

Obs.—In some points this species approaches the description of *D. leptospadix*, Mart. (Palmet. Orb., p. 52), but it differs sufficiently in the armed vagina of the leaf, in the spines on the pinnæ, in the obovate fruit, and in the habitat, growing among herbs and low shrubs on open campos instead of in virgin forest. In addition, the description of *D. leptospadix* makes no mention of the small size of the plant, and of the hard and strongly plicated character of the pinnæ, all very noticeable points in *D. pumilus*. At Manaos (no. 105, Trail hb. Palm), and on the Rio Javary I met with a *Desmoncus* in virgin forest that agreed with *D. leptospadix* in stem and leaves, so far as could be determined from the description quoted, though the absence of spathe and spadix prevents identification. I think myself justified, for the above reasons, in regarding *D. pumilus* as an undescribed species. It is called "*Jacitara pui*" in Lingoa geral.

DESCRIPTION OF TAB. 183, REPRESENTING NEW PALMS FROM THE AMAZON.

I. *Geonoma oligoclona*, n.s.—1. A leaf, $\frac{1}{6}$ nat. size. 2. Spadix and spathes, $\frac{1}{3}$ nat. size. 3. Portion of spadix, nat. size. 4. Portion of branch to show alveole. 5. ♂ flower, nat. size; parts dissected, × $2\frac{1}{2}$. 6. ♀ flower; parts dissected, × 3.

II. *G. leptospadix*, n.s.—1. A leaf, $\frac{1}{8}$ nat. size. 2. Spathe, and 4. Spadix, $\frac{1}{4}$ nat. size. 3. Spathes, nat. size. 5. Portions of branch showing alveole and arrangement of flowers. 6. Spadix with peduncle flexed and branches crowded, as frequently found under the mass of rubbish (see description). 7. ♂ flower, dissected, and andrœceum of ♀ flower, × 3. 8. Fruit and nucleus, nat. size.

III. *Calyptronoma ? robusta*, n.s.—1. Portion of branch of spadix. 2. Fruit. 3. Different views of mesocarp to show arrangement of fibres. 4. Nucleus. 5. Section of nucleus to show position of embryo. All are of the natural size.

IV. *Desmoncus pumilus*, n.s.—1. A leaf, $\frac{1}{4}$ nat. size. 2. A leaflet, nat. size. 3. Spadix and spathes, $\frac{1}{3}$ nat. size. 4. ♀ flower, × 6. 5. A fruit, nat. size.

Genus BACTRIS, *Jacq.*

This genus alike in number of species and in number of individuals is by far the richest in the Amazon Valley, *Geonoma* alone approaching it. Owing to the comparatively small size of the species, however, they do not aid much in giving a marked character to the forests, by far the most species being hidden among the undergrowth, or among the dense jungle that springs up on deserted clearings. They must, therefore, be looked for, but when looked for are found to be absent from few localities save open campos, in which I do not remember ever to have seen any species.

I use the generic name in the wide sense, as it seems to me that the various genera proposed by Karsten, Oersted, and others are not founded on good characters, though some of them may with advantage be employed for dividing the genus into sections. Were the possession of a sterile andrœcium or its absence to be regarded as good grounds for founding a new genus (as Karsten has done), then very closely-allied species must be separated, so that the genus *Bactris* (as it now stands) would be broken up into two genera containing series of species more or less parallel. However, this is not the place to enter into a discussion on the value of the various genera into which it has been proposed to break up the genus. I subjoin a key, with short diagnoses of the species and varieties described below. Where no author's name is quoted after a species or variety described below, such species or variety is described here for the first time.

Analytical key of the genus BACTRIS, *Jacq.*

§ 1. (= § *Humiles* and § *Sphærocarpæ* of Martius.)—Fl. ♀ andrœcei vestigium nullum.

A. *Microcarpæ.*—Fructus globosi vel obovati, pisi magnitudinis, rubri (demum purpureo-nigri); putamen globosum vel turbinatum; palmæ humiles (*B. tomentosa* mediocris), tenues, inermes vel aculeatæ; folia simplicia vel pinnata; pinnis concinnis; spadix simplex vel in ramos 2-7 fissus.

B. Fl. ♀ calyce et corolla cupularibus; spadice simplici vel bifido; fructibus inermibus.

C. Spatha interiore et spadicis pedunculo inermibus raro subarmatis.

D. Palma inermi, raro subarmata; foliis simplicibus bifurcis, vel pinnis 1½-2-jugis ornatis . *B. simplicifrons*, Mart., var. *subpinnata*.

DD. Palma inermi vel aculeata; foliis pinnatis, pinnis 3-10-jugis, longe tenui-acuminatis . . *B. mitis*, Mart.

* Pinnis 3-6-jugis; spathis inermibus; spadice simplici vel bifido . . . . . . subsp. *inermis*.

CC. Spatha interiore et spadicis pedunculo aculeis armatis; pinnis 20-26-jugis, apice bidentulis supra nitenti-viridibus glaberrimis; spadice bifido; costa folii dense setoso-ciliata; caudice aculeato . . . . . *B. elegans*.

BB. Fl. ♀ calyce plerumque membranaceo annulari, trigono; corolla cupulari extus lanata vel villosa; spatha interiore setis vel aculeis plerumque contortis armata (*B. hirtæ*, Mart., inermi); spadicis simplicis vel in ramos 2-7 fissi pedunculo villoso et plerumque aculeato; fructibus plerumque aculeolatis; palmæ semper armatæ.

E. Foliis pinnatis, pinnis 6-12-jugis, lanceolatis, subfalcato-acuminatis, 2-3-natim aggregatis.

F. Pinnis 6-10-jugis supra nitenti-viridibus, subtus albidis; spadice 4-7-fido; fructibus inermibus *B. cuspidata*, Mart.

* Pinnis coriaceis, ovato-lanceolatis, cuspidatis var. *coriacea*.

** Pinnis tenuioribus, lineari-lanceolatis subfalcato-acuminatis; spadice trifido var. *angustipinnata*.

FF. Pinnis 7-12-jugis subtus pubescentibus vel pilosis; spadice simplici.

* Pinnis 7-8-jugis subtus brevissime tomentosis coriaceis; costa ferrugineo-leprosa; spadicis pedunculo aculeato . . . *B. tomentosa*, Mart.

** Pinnis 8-12-jugis tenuioribus, supra subtusque pilosis; costa ciliata; spatha setosa; spadicis pedunculo pubescente . . subsp. *capillacea*.

EE. Foliis simplicibus vel pinnatis, pinnis lineari-lanceolatis 9-20-jugis 3-8-natim aggregatis vel pectinatis.

G. Foliis simplicibus, bifurcis; venis primariis utrinque 6-12; spadice simplici vel bifido.

H. Petiolo lamina breviore, pubescente, aculeis horrido; venis utrinque 6-7; foliis pluribus, atro-viridibus, subtus pubescentibus *B. hirta*, Mart., subsp. *pulchra*.

HH. Petiolo plerumque laminam excedente, ferrugineo-leproso, subinermi; venis utrinque 12; foliis paucis, supra subtusque pilosis *B. longipes*, Popp.

* Minor, petiolo breviore; venis utrinque 9 var. *exilis*.

GG. Foliis simplicibus vel pinnatis; venis utrinque 14-20; spadice 2-4-fido.

* Foliis pinnatis ; fructibus inermibus *B. pectinata*, Mart.

* * Fructibus setosis v. aculeatis.

† Pinnis 20-jugis et pluribus, supra subtusque dense pilosis . subsp. *microcarpa*, Spr.

†† Pinnis 12-17- (24) jugis supra fere glabris subtus pilosis . subsp. *hylophila*, Spr.

‡ Foliis simplicibus, bifurcis var. *subintegrifolia*.

††† Pinnis 9-14-jugis supra subtusque fere glabris . . subsp. *turbinata*, Spr.

‡ Foliis simplicibus vel pinnis utrinque 4-14 . . . var. *Spruceana*.

AA. *Sphærocarpæ*.—Fructus sphæroidei, ·01^{m}-·02^{m} diametro, putamen lenticulare, subtriangulare; palmæ aculeatæ; spatha interior aculeis vel setis armata; calyx et corolla cupulares subæquilongi, vel corolla subduplo longior, plerumque sparse setosa vel tomentosa.

I. Foliis simplicibus bifurcis, vel pinnis 2-6-jugis, subplicatis rigidiusculis; venis utrinque 8-16; spadice simplici vel bifido.

J. Vagina et petiolo aculeis sparsis armatis ; spadice simplicis.

* Foliis simplicibus ; alis ·40^{m}-·65^{m} × ·05^{m}-·08^{m} ; venis utrinque 9-10, angulo costali 18°-23° *B. sphærocarpa*.

† Alis ·30^{m} × ·04^{m} ; venis utrinque 8 . var. *minor*.

†† Subinermis, alis angustis ·32^{m}-·70^{m} × ·025^{m}-·045^{m} ; venis utrinque 7-8, angulo costali 10°-12° var. *ensifolia*.

††† Alis ·80^{m}-·90^{m} × ·10^{m} ; venis 14, angulo 15°-16° var. *platyphylla*.

** Foliis pinnatis, pinnis bijugis . subsp. *pinnatisecta*.

JJ. Caudice 1·50^{m}-3·0^{m} ; petiolo superne solum aculeis armato, pinnis 2-5- (6-) jugis ; venis utrinque 12-14 ; spadice bifido . . . . *B. fissifrons*, Mart.

* Foliis longioribus (1·50^{m}-1·80^{m}), pinnis 5-6-jugis ; venis utrinque 15-16 ; spatha et spadice majoribus var. *robusta*.

II. Foliis pinnatis, pinnis lanceolatis vel lineari-lanceolatis, subfalcatis tenui-acuminatis, 1-veniis (apicalibus et basalibus exceptis), omnibus in eodem plano.

K. Spadice simplici vel 2-3-fido ; spatha interiore (inermi vel) aculeis medio pallidioribus armata, nec setosa, pinnis 3-6-jugis ; palmæ humiles.

L.* Spadice simplici ; spatha valide armata ; pinnis 3-3½-jugis, lato-lanceolatis, aculeis subulatis ; fructibus glabris . . . . *B. eumorpha*.

** Spadice bifido ; spatha aculeis tenuibus nigro-badiis armata ; pinnis 3-5 jugis, lineari-lanceolatis ; fructibus ? . . . . . subsp. *arundinacea*.

LL. Spadice 2-3-fido ; spatha inermi vel aculeis compressis armata ; pinnis 4-6-jugis lanceolatis ; ovario sparse piloso . . . . . . *B. Juruensis*.

KK. Spadicis rachi plerumque brevi, ramos 3-6-12 proferente ; spatha interiore setulis badiis dense obsita, et sæpe aculeis latis compressis armata ; pinnis 4-24-jugis, 2-8-natim aggregatis, rarius æquidistantibus. Humiles v. mediocres.

M. Spadice 3-fido; spatha haud aculeata; pinnis 9-12-jugis; petiolo subinermi rachique setis badiis obsitis; fructibus glabris (roseis vel viridibus); caudice ·07^{m}-·30^{m} . . . . *B. piranga.*

MM. Spadice 3-fido; spatha subarmata; pinnis 3-3$\frac{1}{2}$-jugis; petiolo in facie inferiori ad basin aculeis tenuibus nigris armato, et unacum costa ferrugineo-leproso, nec setoso . . *B. incommoda*, sp.?

MMM. Spadicis ramis 6-10; spatha plerumque aculeata; fructibus pilis setulisve sparsis armatis, purpureis . . . . . *B. trichospatha.*

* Pinnis 4-6-jugis, 2-natim aggregatis; spadicis ramis 6; caudice ·90^{m}-2·40^{m} subsp. *Jurutensis.*

** Pinnis 11-18 jugis, 3-8-natim aggregatis; spadicis ramis 6-9; caudice 1^{m}-3^{m} . subsp. *trichospatha.*

† Major, pinnis 19-26-jugis; spadicis ramis 9-12; caudice 3^{m}-7^{m} . . . . var. *elata.*

KKK. Spadicis rachi producto, ramos 7-22 sursum attenuatos proferente; spatha interiore lignea, aculeis erectis vel adpressis armata; fructibus glabris, purpureis; pinnis 9-14-jugis; costa folii glabra, aculeata; caudice (2^{m}-3^{m}) 4^{m}-5^{m}; fructibus glabris.

* Caudice 4^{m}-5^{m}; pinnis 10-12-jugis, lanceolatis; spatha interiore ·70^{m} aculeis medio stramineis fragilibus compresso-triquetris horrida; spadicis ramis 20 et pluribus, ·20^{m}-·25^{m} . . . . . . *B. Marajá*, Mart.

** Caudice 3·0^{m}-5·0^{m}; pinnis 9-jugis lineari-lanceolatis; petiolo superne solum ad medium aculeis valide armato; spatha interiore ·35^{m} aculeis sparsis brevibus armata, brevissime pilosula; spadicis ramis 7, ·10^{m} subsp. *sobralensis.*

*** Caudice 2·0^{m}-3·0^{m}; pinnis 10-14-jugis, lato-lanceolatis; petiolo valide aculeis badiis armato; spatha ·25^{m}-·35^{m} aculeis sparsis brevibus armata; spadicis ramis 11-13, ·07^{m}-·08^{m} (fructibus ovalibus?) subsp. *limnaia.*

III. Foliis pinnatis (raro simplicibus), pinnis crispis, decurvo-patentibus vel subflaccidis, 2-4-natim aggregatis, ad petiolos et costas subtus aculeis nigris, nitidis, longis, solitariis vel binatim aggregatis armatis; spadicibus multiramosis.

N. Pinnis 7-18-jugis (plerumque binatim aggregatis, et pinna inferiore minore) lanceolatis vel lato-lanceolatis, subfalcatis, ad apicem in cuspidem longissimam abrupte attenuatis, supra glabris, nitidis.

O. Pinnis 7-10-jugis, lanceolatis; spatha aculeis ·01^{m}-·04^{m}, albido-badiis horrida; spadicis ramis 8-10; drupis glabris purpureis . *B. confluens*, Lind. et H. Wenj., var. *acanthospatha.*

OO. Pinnis 14-18-jugis, lato-lanceolatis; spatha aculeis ·005^{m}-·008^{m}, nigris, sparsis; spadicis ramis 20-25; drupis coccineis processibus carnosis rubris ·003^{m}-·004^{m} semierectis dense obsitis (apice nudo) *B. Constanciæ*, Barb. Rod.

NN. Pinnis 30-35-jugis, 2-4-natim aggregatis ensiformibus, longe acuminatis, vel foliis simplicibus bifurcis; spadicis ramis 30-60; drupis rubris, nigro-setosis.

* Pinnis 30-35-jugis; caudice 1·5^{m}-·4^{m} *B. acanthocarpa*, Mart.

** Foliis simplicibus, bifurcis; lamina 1·5^{m}-1·8^{m} × ·3^{m}-·35^{m}; venis primariis utrinque 21-25; caudice ·0^{m}-·15^{m} subsp. *Trailiana*, Barb. Rod.

§ 2. (=*Oocarpæ*, Mart.=*Guilielma*, Karsten, nec Martii.)—Fl. ♀ andrœceo sterili membranaceo cupulari, corollæ fundo adnato præditus; fructus plerumque ovatum vel oblongum, putamen ovatum vel oblongum.

P. Fructibus ·012^{m}-·025^{m} × ·008^{m}-·015^{m} glaberrimis, nitidis; spadice simplici; spatha interiore inermi; foliis pinnatis; pinnis bi-trijugis, falcato-lanceolatis, longe acuminatis; petiolo ad basin et vagina aculeis tenuibus nigris sparse armatis; caudice ·30^{m}-1·0^{m} . . . . . . *B. oligocarpa*.

PP. Fructibus plerumque scabris vel setosis; spadice simplici vel ramos 2 8 proferente; spatha interiore aculeata; foliis simplicibus, pinnatisectis vel pinnatis, pinnis (7-16) 20-40-jugis ensiformibus, vel sublanceolatis, planis, rigidiusculis; vagina et petiolo valide aculeis armatis; caudice aculeato 1·0^{m}-4·0^{m}; spadice simplici, raro bifido.

Q. Spadice simplici.

R. Foliis bifurcis, siccis subtus iridescentibus, valide plicatis.

* Caudice 1·4^{m}-3·0^{m} aculeato; lamina ·5^{m}-·9^{m} × ·17^{m}-·28^{m}; venis utrinque 18-20, rectis, angulo costali 12°-14°; vagina valide armata . . . . *B. bifida*, Mart.

** Caudice ·9^{m}-1·2^{m}, inermi, tenui; lamina ·70^{m} × ·15^{m}; venis utrinque 15-17, angulo costali 10°; vagina subinermi; fructibus minoribus . . . var. *Humaitensis*.

*** Caudice vix 1·0^{m}, inermi; lamina 1·4^{m}-1.5^{m} × ·12^{m}-·14^{m}; venis utrinque 20-21, angulo costali 6°; spatha interiore et spadice paullo longioribus . . . var. *Puruensis*.

RR. Foliis pinnatisectis, pinnis utrinque 7-16, sæpe ultimis connexis, et valde plicatis; venis utrinque 24, angulo costali 17°-27°; spadice simplici vel bifido; caudice ·3^{m}-4·5^{m} . . . . . . *B. aristata*, Mart.

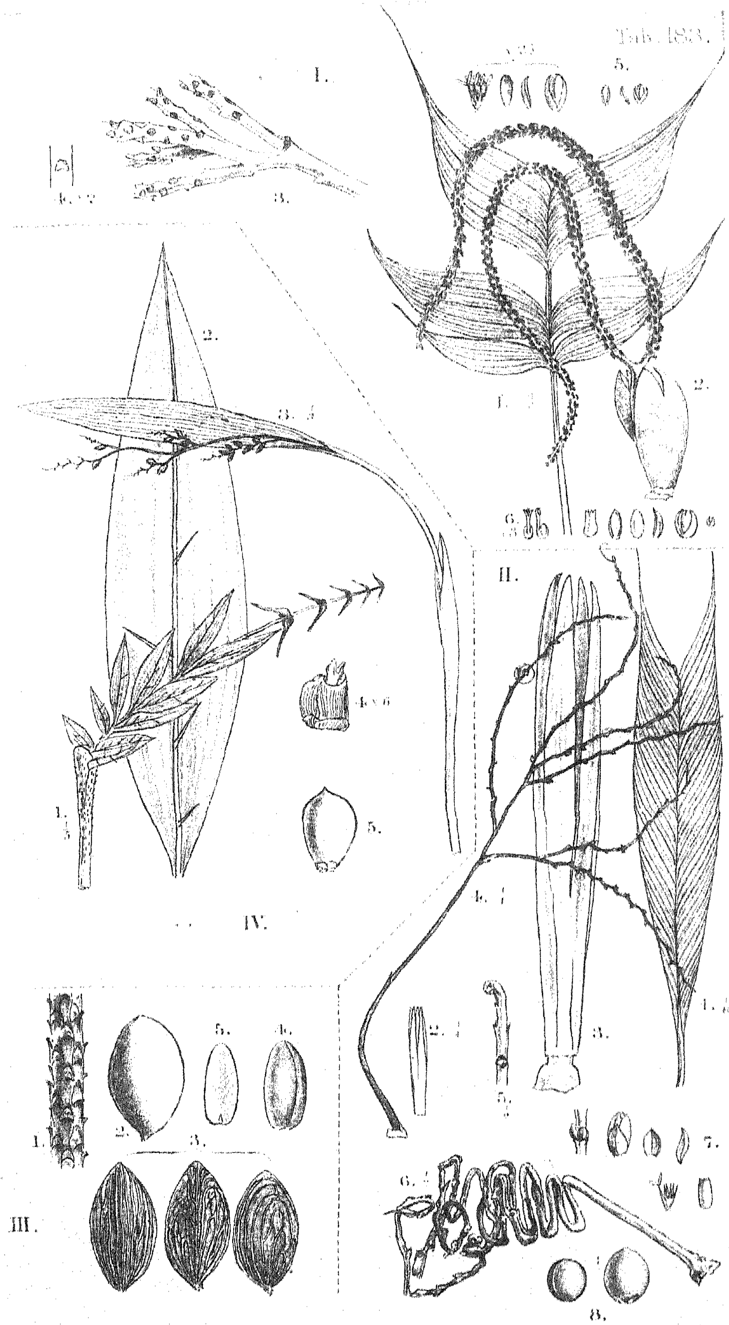
RRR. Foliis pinnatis, pinnis 25-40-jugis, pectinatis; spatha interiore aculeis nigris horrida; caudice 2·5^{m}-4·5^{m} et vagina aculeis nigris horrida *B. concinna*, Mart.

* Palma minor; pinnis 17-21-jugis; spatha interiore aculeis tenuibus armata ·15^{m}, et spadice ·15^{m}; caudice 1·2^{m}-·1·5^{m} inermi; vagina subaculeata, subsp. *depauperata*.

QQ. Spadice ramos 3-4 robustos proferente; fructibus ovalibus, scabris; pinnis 29-33-jugis, ensiformibus, rectis.

* "Fructibus elliptico-globosis, vertice acutis, 2 poll. et quod

Tab. 183.



J Trail del. D. Blair lith.

Mintern Bros. imp.

I, Geonoma oligoclona, *Trail.* II, G. leptospadix, *Trail.*

III. [illegible]

excedit, putamen 1 poll. et quod excedit; pinnis 33-34-jugis, pectinatis; caudice aculeis nigris ad nodia in circulos digestis armato; rachibus tomentosis, aculeatis." *B. socialis*, Mart.

** Fructibus ovalibus, acuminatis $\cdot 025^m \times \cdot 015^m$, putamen sub $\cdot 018^m$, albido; pinnis 33-jugis pectinatis dissitioribus; caudice aculeis compressis ad internodia armata; costa (rachi) setis badiis dense vestita, aculeata; spadicis pedunculo aculeis horrido; spatha interiore aculeis subsp. *Gaviona*.

*** Fructibus ut in *B. Gaviona*; pinnis 29-jugis, 2-7-natim aggregatis; caudice ad nodia aculeis annulato; costa aculeata, nec setosa; spadicis pedunculo aculeolis badiis velutino nec aculeato; spatha subinermi . . · subsp. *Curuena*.

QQQ. Spadice, setis badiis velutino, ramos 6-8 tenues proferente; spatha interiore extus pelli animalis hirsutæ simili; fructibus ovatis, longe cuspidatis, fuscis, setosis; pinnis 20-21-jugis, lanceolatis, subfalcato-cuspidatis, supra venis transversis striatis, subtus pilosulis; vagina petiolo et costa badio-pilosulis . . . . *B. turbinocarpa*, Barb. Rod.

Species intæ sedis.

Caudice humili, inermi; foliis sub $1{\cdot}5^m$; petiolo glabro ad basin aculeis nigris armato; pinnis 30-35-jugis, concinnis, pectinatis, lineari-lanceolatis, supra ad venam mediam, subtus ad venas apicem versus, et ad margines setoso-ciliatis; spatha interiore aculeata?; spadice ramoso, pedunculo aculeis nigris brevibus horrido; rachi producta ramos 7 edente. . . *B. syagroides*.

(*To be continued.*)

RECENT ADDITIONS TO THE BRITISH LICHEN-FLORA

By the Rev. J. M. Crombie, F.L.S.

The following very considerable and interesting list of new, rare, or hitherto overlooked species and varieties of Lichens detected in Great Britain and Ireland, since my last notice in Journ. Bot. 1875, p. 140, and of which I have duly seen specimens, has now to be recorded.

1. **Collema hypergenum*, Nyl. in Flora, 1876, p. 232.—On stones of Tullywhee Bridge, Kylemore, Galway (Larbalestier); a subspecies of *C. melænum*, with larger spores.

2. *Leptogium bolacinum* (Ach.) = *Cornicularia Umhauensis*, Auersw.—Amongst Mosses on trunks of trees and rocks. Barcaldine, Argyleshire (Crombie); Snowdon, Wales (E. M. Holmes).

3. *Collemopsis Arnoldiana* (Hepp.)—On calcareous stones, near Cirencester, Gloucestershire (W. Joshua).

4. *Calicium elassosporum*, Nyl. in Flora, 1875, p. 441, sp. n.—On putrid trunks of Alders. Glen Lochay, Perthshire (Crombie).

5. *Stereocaulon evolutum*, Graewe. — On rocks. Barcaldine, Argyleshire. (Crombie); near Kylemore, Galway (Larbalestier).

52. *L. livescens*, Leight, l. c., sp. n.—On mountain rocks with the preceding (Larbalestier). Very rare.

53. *L. nitescens*, Leight., l. c., p. 79, sp. n.—On rocks. Salrock Road, Connemara (Larbalestier). Extremely rare.

54. *L. tenebrans*, Nyl. in Flora, 1876, p. 309, sp. n.—On subalpine micaceous rocks. Summit of Doughruagh (Larbalestier). Rare.

55. *L. subumbonata*, Nyl., l. c., p. 236, sp. n.—On moist rocks. Dawros River (Larbalestier) and elsewhere in the neighbourhood of Kylemore.

56. *L. grisella*, f. *meiosporiza*, Nyl. in Flora, 1876, p. 239.—On rocks and boulders. Morrone, Braemar (Crombie); near Kylemore (Larbalestier).

57. *L. pedatula*, Nyl., l. c., p. 236, sp. n.—On rocks. Kylemore (Larbalestier). Very rare; associated with *Sirosiphon saxicola*, Naeg.

58. *L. advenula*, Leight. in Linn. Trans. Bot., ser. 2, 1., p. 146, sp. n.—Parasitic on thallus of *Pertusaria sulphurea*. On rocks. Llanbedrog, near Pwllheli, N. Wales (Leighton); Letter, Galway (Larbalestier).

59. *L. parellaria*, Nyl. in Flora, 1876, p. 239.—Parasitic on thallus of *Lecanora parella*. On shady rocks. Doughruagh mountain, Galway (Larbalestier).

60. *L. Zwackhii*, Mass.—Parasitic on the thallus of *Pertusariei*. Chedworth Woods, Gloucestershire (W. Joshua).

61. *Odontotrema majus*, Leight.—On old pales. Oakley Park, Cirencester (W. Joshua).

62. *Arthonia dendritica* (Leight in Journ. Bot., 1875, p. 257, ut *Stigmatidium*).—On rocks. Tully, Doughruagh, Galway (Larbalestier). Very rare.

63. *A. hibernica*, Nyl. in Flora, 1876, p. 237.—On the smooth bark of trees. Near Kylemore (Larbalestier). Perhaps only a subspecies of *A. excipienda*.

64. *A. sapineti*, Nyl., l.c., p. 239.—On Holly. Near Kylemore (Larbalestier). Rare.

65. *A. cinnabarina*, f. *cuspidans*, Nyl.—On trees. Doughruagh (Larbalestier). Rare.

66. *Opegrapha areniseda*, Nyl. in Flora, 1875, p. 447, sp. n.—On fine maritime sand. St. John's, Jersey (Larbalestier).

67. *Graphis petrina*, Nyl. in Flora, 1876, p. 310., sp.n.—On moist schistose rocks. Base of Letter Hill, Galway (Larbalestier). Very rare.

68. *Xylographa flexella* (Ach.).—On decorticated stumps. Near Cirencester (W. Joshua).

69. *Verrucaria affinis* (Mass.).—On Holly. About Kylemore in various places (Larbalestier).

70. *V. aquilella*, Nyl. in Flora, 1876, p. 237, sp. n.—On micaceous rocks. Lough Inagh, Galway (Larbalestier). Rare.

71. *V. saxicola*, Mass.—On calcareous walls. Sapperton, Gloucestershire (W. Joshua).

72. *V. myriocarpa*, Hepp.—On moist rocks. Lough Inagh (Larbalestier). Rare.

73. *V. deminuta*, Arn.—On moist rocks, with the preceding (Larbalestier). Rare.

74. *V. myriospora*, Leight. in Linn. Trans. Bot., ser. 2, 1, p. 145, sp. n.—On young Oaks. Kylemore and Doughruach (Larbalestier). Rare.

75. *V. succina*, Leight. in Grevillea iv., p. 78, sp. n.—On moist rocks. Kylemore Lake (Larbalestier). Very rare.

76. *V. leptalecella*, Nyl. in Flora, 1876, p. 237, sp. n.—On trees. Doughruagh (Larbalestier). Rare.

77. *V. tenuifera*, Nyl., l.c., sp. n.—On quartzose rocks Jersey (Larbalestier).

78. *V. elæomelena*, Mass.—On rocks in streams. Chedworth, Gloucestershire (W. Joshua).

79. *Thelenella modesta*, Nyl.—On the bark of old Birch trees. Barnsley Park, Gloucestershire (W. Joshua). Very rare.

80. *Melanotheca ischnobela*, Nyl. in Flora, 1876, p. 238, sp. n.—On Holly. Doughruagh (Larbalestier). Rare.

81. *Mycoporum ptelæodes*, Nyl.—On smooth bark of trees. Slopes of Cleve Hill, Cheltenham (W. Joshua).

PLANTÆ QUATTUOR NOVÆ HONGKONGENSES

EXHIBET H. F. HANCE.

1. CARDAMINE LAMONTII, *sp. nov.*—Glaberrima, radice fibrosa, caule decumbenti inferne radicante ramoso estolonoso, foliis tenuibus subtiliter nervulosis oblongis obovato-oblongis v. obovatis apice obtusis basi cuneatis irregulariter repando-dentatis inferioribus nunc lobulo brevi acuto basi auctis, inferioribus petiolo marginato iis longiore v. æquilongo-fultis, mediis sensim brevius petiolatis superioribus sessilibus ¾-2½ poll. longis, racemis ramulos terminantibus 1-2-nis demum elongatis 15-25 floris pedicellis sub anthesi erectis flore subduplo brevioribus fructiferis patentibus siliqua subtriplo brevioribus, sepalis oblongis 1-1¼ lin: longis, petalis albis spathulato-obovatis 1½-1⅞ lin. longis, staminibus 6 petalis vix brevioribus, siliquis linearibus 10 lineas longis, stylo semilineali, stigmate dilatato subbilobo, seminibus 60-80 compressis flavido-brunneis.

In silvula ad pagum Heongkong, Sept., 1874, offendit amiciss. Rev. J. Lamont. (Herb. propr., n. 19355.)

Finitima certe, necnon habitu aspectuque satis similis, *C. rotundifoliæ*, Mx.! abs qua foliorum forma, floribus minoribus, siliqua polysperma apice haud subulata, stigmate dilatato, conspicue differt. Civium ditissimæ Floræ nostræ additamentum insigne, ob inopinatum cum specie solum boreali-americana necessitudinem. Præter mundanas fere *C. hirsutum*, Linn., et *C. silvaticum*, Lk., singularem *C. paradoxam*, mihi—*C. africanæ*, Linn., imprimis affinem—et stirpem

supra descriptam, nullæ aliæ generis species in China australiori adhuc repertæ sunt. Orientali-asiaticas cunctas solita prudentia nuper pertractavit amicus Maximowicz.*

2. ILEX BUXIFOLIA, *sp. nov.*—Fruticosa, glaberrima, ramulis subteretibus, foliis rigide chartaceis obovatis v. elliptico-obovatis obtusis integerrimis emarginatis supra sublucidis subtus opacis costa subtus prominula venis primariis tenuibus reliquis inconspicuis 14-20 lin. longis 7-10 lin. latis petiolo lineali, cymulis axillaribus sub-sessilibus 5-6 floris petiolo 2-3-plo longioribus, floribus tetrameris circ. lineam longis, calycis cum pedicello ei æquilongo puberuli ad medium 4-fidi lobis ovatis obtusiusculis ciliatis, corolla profunde 4-fida laciiniis oblongis obtusis, antheris filamento duplo longioribus corolla vix duplo brevioribus, ovario (rudimentario ?) minimo stigmate parvo sessili pyramidato coronato.

In silva ad Wongneichung, Maio, 1874, legit Rev. J. Lamont. (Herb. propr., n. 19344.)

Species ab omnibus Floræ nostræ foliis inflorescentiaque discrepans, nec ullam arcte affinem inter alienas proprii herbarii invenio. Genus permultas species ineditas complectens monographis, præcipue ad greges naturales eruendas, enixe commendandum. *Ilicem aquifolium*, Linn., vel stirpem quam adhuc distinguere nequeo a colliniis provinciæ Cantonensis pluries accepi.

3. MELIOSMA SQUAMULATA, *sp. nov.*—Fruticosa, ramulis teretibus, foliis simplicibus rigide coriaceis lanceolatis basi cuneatim attenuatis apice obtuse caudato-acuminatis integerrimis supra glaberrimis nitidis venis omnino inconspicuis subtus opacis pallidis pilis sparsis nigris rarius consitis (oculoque fortius armato inspectis) squamis minutis albis peltatis medio excavatis densissime obsessis elevato-reticulatis venis primariis utrinque 3-4 quam reliquos vix fortioribus ante marginem arcuatim anastomosantibus 2 poll. longis 7-8 lin. latis petiolis 12-20 linealibus rufo-fulvove pilosis, paniculæ terminalis pyramidatæ densiusculæ rufo-tomentosæ rachi stricta compresso-angulata ramis sensim decrescentibus inferioribus compositis superioribus simplicibus, pedicellis plerumque flore duplo brevioribus, bracteola unica oblonga, sepalis 5 rotundato-ovatis æqualibus ciliatis, petalis 3 majoribus rotundatis cucullatis ciliatis minoribus filamentis æquilongis sub apice in lacinulas duas divaricatas antheras æquantes expansis, connectivo apice haud v. vix producto, staminodiis bifoveolatis, disco 5-dentato, ovario glabro.

In silva ad Wongneichung, m. Aprili, 1874, florentem detexit Rev. J. Lamont. (Herb. propr., n. 19316.)

Affinis *M. pungenti*, Walp.! sed foliis subtus lepidotis, haud costatis, caudatis, cæt., differt. *M. rigida*, S. et Z., ex descriptione, foliis costatis (charactere ab iis falso *M. pungenti* denegato), margine spinoso-serratis, diversa. *M. myriantha*, S. et Z.! et *M. tenuis*, Maxim.! longius distant. Forte propius *M. lepidotam*, Bl., mihi haud notam, sed hæc, fide b. conditoris, foliis costulatis, panicula flaccida ea *M. simplicifoliæ*, Walp.! laxiore, petalisque minoribus abbreviatis aperte discrepat. Stirps nostra inter omnes sane distinctis-

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* Mel. biolog. Acad. Pétersb. ix., 2, sqq.

sima. *M. Oldhami*, Maxim., specimen, ab amico Swinhoe in montosis ditionis Ningpoensis lectum, in herbario adservo.

4. CUDRANIA (vel *Cudranus*) RECTISPINA, *sp. nov.*—Ramulis subteretibus ferrugineo-hirtellis, foliis brevi-petiolatis obovato-oblongis obtusissimis emarginatis ex emarginatura mucronatis utrinque glaberrimis subtus pallidioribus costa subtus leviter prominula venis primariis utrinque circ. 6 nequaquam elevatis et vix perspiciendis 10-16 lin. longis 6-8 lin. latis, spinis rectis glaberrimis folia subæquantibus, capitulis brevi-pedunculatis (floribus in specimine suppetenti adhuc inexpansis).

In valle Wongneichung, m. Aprili, 1874, coll. Rev. J. Lamont. (Herb propr. n., 19216.)

A *C. Javanensi*, Tréc. (vel. *C. Rumphii*, Thw. !) foliis minoribus, emarginatis, venis primariis fere duplo paucioribus, cum venulis omnino inconspicuis, spinisque rectis longis differt. Attamen pro istius speciei, quæ satis variabilis videtur, varietate fortassis censenda : icones Rumphianæ* spinas paucas reliquis multo longiores exhibent. Nescio quibus adductus rationibus cl. Trécul nominis Rumphiani—etsi ante-Linnæani haud quaquam improbabilis—exitum mutaverit. Specimina quædam *C. trilobi*, mihi, in agro Chifuensi ab amico Swinhoe lecta, folia rhombea v. trapezoideo-ovata haud lobata ostendunt. Variatio compar in nonnullis *Fici* speciebus occurrit.

NOTES ON SOME HERTFORDSHIRE CARICES.

By R. A. PRYOR, B.A., F.L.S.

In the preparation of the Flora on which I am engaged, I have found it necessary to pay considerable attention, among other doubtful points, to those connected with some of our more interesting Carices. The following notes are based on the examination of a number of specimens preserved in the collection of the late Rev. W. H. Coleman and in other herbaria, but more especially in the growing state.

Carex lepidocarpa, Tausch.

After some consideration and the comparison of numerous examples from different parts, I have come to the conclusion that we have but one form of *C. flava* in the county, and have little hesitation in reducing both the "*flava*" and "*Œderi*" of the "Flora Hertfordiensis" to *C. lepidocarpa*, Tausch. Variable as this sedge is in appearance, and ranging from eighteen to barely three inches in height, it can, I believe, be readily recognised, at all events in the living state. Besides the usually longer-stalked male spikelet, and the roughness of the upper part of the stem, the perigynia are generally not above half the size of those of *C. flava*, and the shorter beaks are either almost straight, or have rather the appearance of having been forcibly bent downwards, instead of the natural and almost double curvature of those of the genuine plant.

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* Herb. amboin. v., tab. 15, 2; 16, a.

C. fulva, Goodenough.

The history of this supposed species has been always attended with many circumstances of obscurity, and the name has been used in widely different significations.

It was originally described by Goodenough in the second volume of the "Linnean Transactions," where he characterises it in the following terms:—"*C.* vagina infima subdimidiata, superioribus subæquantibus, spicis fœmineis duabus oblongis acutis, capsulis rostrato-acuminatis: *Carex distans*, Fl. Dan., t. 1049[*], prope Eaton, juxta Shrewsbury, in agro Salopiensi: Rev. E. Williams."

And after a detailed description, which it is not necessary to quote, he proceeds at some length to contrast his new species with that immediately preceding it, as under—

"This plant is scarcely removed from *C. flava.* However, it differs from it in having the angles of the culm sharp and rough; the female spikes are remote, oblong, and acute, not round; the lowermost is supported by a long foot-stalk, half of which nearly appears above the vagina. Besides, it has scarcely ever more than two female spikes. The lowermost bractea is erect, and not divaricated. The capsules are not divaricated, but patent, and are slightly divided at the summit. I regret that I have had no opportunity of cultivating it. I am indebted to the Rev. Mr. Williams, of Eaton, near Shrewsbury, for my knowledge of this plant as a native of Britain. I have received it from America and Newfoundland, but I never understood till very lately that it was an inhabitant of our country." (Linn. Trans. vol. ii., p. 177. Read April 3rd, 1792.)

In this description the roughness of the culm is a character, at least in a lesser degree, common to *C. lepidocarpa*, which also has not unfrequently but two, or occasionally even only one, female spikelet; and in the case, as perhaps usually happens, of a greater number the lowest spikelet is often considerably removed from the rest. On the other hand, both in the number of the spikelets, and in the length of the lowest bract ("culmum plerumque æquans," Good. l.c.), the plant here described recedes clearly from *C. Hornschuchiana*, Hoppe, with which Goodenough's species has been identified by some Continental botanists, and with which it has, as I believe, been generally confused among ourselves. The figure (tab. 20, fig. 6),[†] as was usual at that period, is drawn from a plant with unripe fruit, and adds but little to our knowledge of its character, and except for the longer sheath of the lowest bract, and the exserted pedicel which accompanies it, might well have been taken from an ordinary example of immature *C. flava*.

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[*] This figure has been very variously applied, and was considered by Smith to represent his *C. speirostachya*, in spite of the "pointed scale accompanying the fruit" (Eng. Flo., v. 4, p. 99); Hoppe, however, seems again to refer it to his *C. fulva*.

[†] Goodenough's plate is copied by Schkuhr, "Riedgräser," tab. T., No. 67; he has added, however, a figure of *C. Hornschuchiana*, from which the details, and especially the very characteristic female glume, are taken. In the copy that I have seen (the Linnean Society's, formerly in the possession of J. Woods) the difference of colouring in the two plants is well preserved. Schkuhr quotes *C. trigona* of Allioni (Fl. Ped., No. 2325) as a synonym, a name that if rightly referred would take precedence (1785) of that of Goodenough. The female spikelets are said to be "manifeste et perfecte trigonæ, qua nota facillime a proximis speciebus distinguitur," which does not apply to any British specimens of the so-called *fulva* that I have seen. In the figure (tab. 89, f. 4) the upper bracts are very short, while the lowest is disproportionally long, and greatly exceeds the male spikelet, but this perhaps is an accidental deformation; in other respects it is not unlike *C. Hornschuchiana.* The same synonym has been

A new species was thus introduced into our flora, closely allied to *C. flava*; nor was any other relationship indicated by its author. The question was, however, reconsidered, and three years later, and after the receipt of additional specimens from the same correspondent, Goodenough took occasion in his second paper on our native Carices to give expression to a decided alteration in his views. "When," he remarks, "I inserted *C. fulva* as a distinct species, I did it in consequence of a variety of specimens sent me by my friend, Mr. Williams; all of which being nearly the same as that represented in the figure given in my former paper, and entirely corresponding with my foreign specimens, I concluded that I had nothing further to discover. Mr. Williams has since sent me specimens of more forward growth which prove it to be a variety of *C. flava.* In the figure of my former paper it is represented with three female spikes; it very seldom has more than two. I would wish, therefore, to correct the article of *C. fulva*, and make it a variety of *C. flava*:—*C. flava*, var. *β*., spicis fœmineis duabus" (Linn. Trans., vol. 3, p. 77. Read Jan. 6, 1795). And he would thus appear to have relied mainly upon the reduced number of spikelets to differentiate his former *fulva* even as a variety from *C. flava.* Accordingly, in the following year (1796) we find Withering arranging *C. fulva* as var. 2 of *C. flava*, and supplementing his notice with the important statement that "Dr. Goodenough has authorised me to say that having cultivated the *C. fulva* he is convinced of its being only a variety of the *C. flava*" (Bot. Arr., ed. iii., v. 2, p. 99). Such, then, was the result of the application of the conclusive test of cultivation to the British specimens of the supposed new species; while of the American examples: "It is remarkable," to quote the suggestive words of the illustrious monographer of the genus, "that Goodenough originally received *C. fulva* from America, and that the late Mr. B. D. Greene found it some years back near Boston, and that no one has since met with it there or elsewhere in the States" (Boott, Ill., pt. iv., p. 138). Whatever view then we take of this identification of the Boston plant, it may well be questioned whether the American *fulva* was anything more than a transitory phase of some other species.

There can be little doubt that the claims of *C. fulva* to specific rank were fully and finally withdrawn by their original author, as having been founded on a misconception resulting from the examination of plants of immature growth. Sir James Smith, however, seems to have been of a different opinion. In his "Flora Britannica"

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referred by Reichenbach, I know not on what grounds, to his *fulva*, which he distinguishes from *Hornschuchiana*. On the other hand, Degland quotes *C. trigona* as well as Haller's "C. culmo foliisque firmis erectis, spicis fœmineis quaternis longe petiolatis erectis" (Nomencl., n. 1383) under his *C. fulva*, which is not that of Reichenbach, and the description obviously cannot be applied to Goodenough's plant.

(1804) he remarks of *C. fulva* (v. 3, p. 991), "videtur species a *C. flava* distinctissima"; and adds, "very common in Mearnshire. . . Prof. S. Beattie, junr.," to Goodenough's previously recorded station. The two localities are repeated without any addition in his "English Flora" (1828, v. 4., p. 108), where it is said to be "not very unfrequent," and is stated to be "more allied to *C. distans* and *speirostachya* than to *flava*," and to be undoubtedly very distinct, although confounded with all three species, so that neither the recorded places of growth nor the synonyms can be relied on. In his "English Botany," No. 1295*, published in the same year as, and probably immediately after, the issue of his Latin Flora, Smith has further noticed that "some erroneous specimens led the accurate Dr. Goodenough to reduce this (*C. fulva*) to a variety of *C. flava*, but we have traced the cause of this mistake." I have been unable to learn anything of the authority for this statement, which would imply yet another change of opinion on the part of the original describer. It is not easy to accept Smith's solution of the difficulty, as his remarks are in apparent conflict with the earlier as well as the later views of Goodenough, nor is it certain that his own judgment was always consistent with itself. It is difficult to see how the same species can be "scarcely removed from *C. flava*," and yet not only "very distinct from it," but "more allied" to *C. distans*. Nor has an examination of contemporary herbaria served to throw much light on the points in question.

In the first place, it is remarkable that there should be no British specimens of this controverted Sedge among Sir J. Smith's own plants. A sheet marked "*flava*" from Teesdale has at some subsequent period (not by Smith) been placed among the "*fulvæ*," with a query; no doubt, however, can, I think, attach to the correctness of the original name. There are three sheets marked "*speirostachya*," including the original specimens from David Don; and one labelled "*C. fulva* diversissima a *flava*"; the only British examples, from "Aberdeen, Prof. Beattie, 1799," and "Scotland, Mr. Mackay, 1796;" have been altered by Dr. Boott† to *speirostachya*, an identification in which I have no doubt (if it is necessary to say so) that he was correct; they are quite indistinguishable from those on the former sheets. Thus *C. Hornschuchiana* (*speirostachya*) seems to have completely absorbed the reconstituted *fulva* of Smith, and it must be remembered that he became acquainted with the former as a native of Britain but a short time before his death. A plant in Rudge's herbarium labelled "*C. fulva*, a *C. flava* distinctissima," and collected in Anglesea by Dawson Turner, who might have been supposed to have

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[*] The E. B. figure has usually been quoted with some degree of hesitation, and it is uncertain whether it was actually drawn from Shropshire specimens. It is worth remarking that the roughness of the beak of the perigynium which is so conspicuous in the original engraving, and of which Smith has noted on the drawing itself, "roughness right, very important," has been entirely omitted in the revised plate of Syme.

[†] Boott MS. in sched. "The specimens in his (Smith's) herbarium from Beattie, which he quotes under his *C. fulva*, have the orifice of the perigynium distinctly membranous."—Boott, Illustr., pt. iv., p. 138.

known Smith's species is undoubtedly *C. distans*. Winch's specimens in the possession of the Linnean Society, as well as some others derived from the same source in Sowerby's herbarium, are mostly *C. Hornschuchiana*,* while of the Shropshire examples in the latter collection, from Sir James Smith himself, and stated by him on the ticket to differ "from *flava* abundantly, particularly in the straight beak of the seed, longer female spike, and rougher stem," one is clearly genuine and well-developed *lepidocarpa*, with a divaricate bract, and deflexed beak to the perigynium.

The same uncertainty will be found to prevail at the present day. On the Continent the name *fulva* has been used indifferently as a synonym for *C. Hornschuchiana*, which has certainly nothing in common with the original description of Goodenough, as well as for the *flava*-like plant which has been contrasted with it. The two standing generally as distinct species. Dr. Hooker places his *C. fulva* as a subspecies of *distans*, taking apparently the Smithian view; while Babington seems rather to have had an eye to the *flava* alliance. Both authors have reduced *C. Hornschuchiana* to varietal rank. Dr. Boswell has described *C. Hornschuchiana*, Tausch., under the name of *C. fulva*,† Goodenough, and quotes Koch (Syn., 889) as an authority, although referring to Reichenbach's figure of "*fulva*" (Icon. viii., n. 620) which was drawn from a specimen from Hoppe himself, and even to the English Botany plate, which reappears with altered fruit in his own pages. For his var. β., which he distinguishes mainly by the longer pedicels, he gives a reference to Reichenbach, n. 621 (*C. Hornschuchiana* from Hoppe), but "had Smith not described it as a species" would "certainly not have noticed it even as a variety" (Syme, E. B., x., p. 153). His third form will be mentioned hereafter. It is more difficult to come to any exact conclusion as to the opinion of Dr. Boott, whose description has apparently been drawn up with the object of reconciling the conflicting aspects of the subject, and whose beautiful illustrations were, I think, evidently selected with a view to the same end.‡ He describes a typical plant for which he quotes Goodenough and Smith; a sterile variety distinguished only by its abortive perigynium;§ and a third form, the *C. Hornschuchiana* of Hoppe.‖ He quotes the analyses of Smith, Hoppe, and Koch, and concludes that many of the characters are not to be depended upon.* I cannot help thinking that the original difficulty as to the *C. fulva* of Goodenough and Smith is at the bottom of this confusion; and Smith's own specimens certainly contributed not a little to confirm any previous bias in this direction.

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* The same may be said of Ed. Forster's, in hb. B. Mus.

† "*C. fulva* of British authors is liable to be confounded, not only with *C. distans*, but also with small specimens of *C. binervis*."—Syme, E. B., vol. x., p. 154.

‡ The figures of *C. Hornschuchiana* (Ill. pt. 4, tab. 443) are not very characteristic of the general habit of that plant; one specimen has crowded spikelets as in some form of *C. flava*.

§ "The distinction between them is the yellow ventriose perigynium with its abortive achenium in the var. β. as contradistinguished from the ultimately brown perigynium with its perfect achenium, in what I have considered the type" (Ib., p. 137).

‖ A specimen in hb. Borrer, labelled, by Coleman, "*C. speirostachya* fide Boott, Woods, &c.," is *binervis*. It is mentioned in Coleman's correspondence as "a Carex which Dr. Boott pronounces to be *C. speirostachya* of Sm., a species he is somewhat inclined to join with *C. fulva*; to me it seems far nearer to *C. binervis*" (Coleman MSS. Corr., 1846). Another specimen in hb. Boott, labelled by Coleman "*C. speirostachya*," seems to be *distans*.

In these doubtful circumstances it seems better to drop altogether a name, which was abandoned as a mistake by its original author, and has now lost all fixedness of application.

C. xanthocarpa, Degl. in Lois. gall., v. 2, p. 299.† F. Schultz in Flora, 1854, p. 471. *C. fulva*, Hoppe in Flora, 1824, p. 593; Koch, Syn., 884; Boreau, Fl. du Cent., 676.

Our Hertfordshire examples exactly agree with those in Schultz's "Herbarium Normale" (cent. 4, No. 378). There are specimens in hb. Boott which are "*admirably* expressive of the *fulva* character" (Boott MS.). Those from another locality in hb. Borrer have been marked by him as "very near to *C. flava*." The lower pedicel is often much shorter than in Degland's description. I have found it growing in much wetter places than the next. It is especially luxuriant near Sawbridgeworth, where it is accompanied by *C. lepidocarpa*.

C. Hornschuchiana, Hoppe in Flora, 1824, p. 599; Koch, Syn., 884, Boreau, Fl. du Cent., 677; *C. fulva*, F. Schultz in Flora, 1854, p. 471; and Hb. Normale, cent. 4, No. 379! *C. speirostachya*, Sm. Eng. Fl. iv., 98.

In drier situations than the preceding, and much more generally diffused throughout the county, as seems to be the case also in Cambridgeshire.

C. xanthocarpa ‡ differs from *C. Hornschuchiana* in its denser growth and more tufted root-stock; in the more luxuriant herbage of a brighter and lighter green; in the roughness of the upper part of the stem, with the lowest bract considerably longer, and generally reaching the male spikelet; the female spikelets fewer, with glumes* of a lighter colour, and proportionally narrower and more inclined to be acute; in the spreading perigynia of a lighter and yellower tint with a rougher beak,† which is devoid of the scarious membrane at the orifice; the male spikelet is more slender and of a lighter colour, but, as observed by Hoppe, far more dense, so that the glumes are with difficulty separated. Its nearest ally seems to be *C. lepidocarpa*.‡

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* "Your *C. fulva* is admirably expressive of its (*fulva*) character, and at the first glance impressed me with a specific difference. But if you look at Koch's description you will see how verbally alike it and his *C. Hosteana* are, and how probable it is that intermediate forms would occur which would be difficult to name" (Boott in litt. to Coleman, 1846). If the verbal similarity of Koch's descriptions is to be taken as evidence of the identity of the plants described, this is not the only species to be erased from our Flora. The specimen itself will be noticed under *C. xanthocarpa*.

† "C. radice subrepente tenaci, culmo pedali obtuso triquetro superne aspero canaliculato, foliis planis rigidulis, vagina truncata, spica mascula tereti utrinque acuta, fœmineis subternis ovatis, infima longius pedunculata vix dimidio vaginata basi interdum ramosa, bracteis foliaceis culmo longioribus ore oblique ligulatis, utriculis striatis flavescentibus rostro tenui bidentatis squamam trinervem cordato-lanceolatam superantibus, fructu turbinato-triquetro fusco.

"Radix subrepens fibris longis barbata. Culmus pedalis striatus obtuse triqueter superne scaber hinc canaliculatus. Folia plana rigidula acuta duas circiter lineas lata, vaginis truncatis. Spica mascula solitaria teres utrinque acuminata cinereo-flavescens, squamis obovatis obtusis margine superiore membranaceis. Spicæ fœmineæ plerumque binæ remotæ ovatæ, infima longius pedunculata haud infrequenter ramosa, suprema subsessili. Bracteæ foliaceæ culmum superantes. Vagina hiatu obliquè ligulata. Utriculi oblongi striati, in rostrum exile hispidulum attenuati, obiter emarginati. Squamæ trinerves cordato lanceolatæ utriculo vix breviores. Fructus turbinato-triqueter fuscus." *Flo. gall.*, v. 2., p. 299 (ed. 2, 1828). The Cyperaceæ in Loiseleur's Flora were described by J. V. Degland, Botanical Professor at Rennes.

‡ This description was drawn up before I had made myself acquainted with Hoppe's remarks in the "Flora" for 1824, with which it will be found to coincide in several particulars.

On the other hand, *C. Hornschuchiana* has a more branched root-stock and scattered mode of growth, with the herbage shorter, more scanty, and of a darker, duller green; the stem is smooth and wiry; the bracts shorter; the female spikelets darker, longer, and much more distant, with broader ovate glumes with a wide scarious margin; the perigynia are of a fuller green when young, and when mature with a conspicuous white membrane at the orifice; the glumes of the male spikelet are laxer; it has altogether much of the habit and general appearance of *C. distans*. It usually represents *C. fulva* in our herbaria.§

While *C. Hornschuchiana* has been almost universally recognised on the Continent as possessing undoubted claims to the rank of an independent series there have been various opinions as to the exact grade and position of *C. xanthocarpa*. The names *fulvo-flava* and *flavo-Hornschuchiana* applied at different times by F. Schultz will speak for themselves.‖ By Godron ("Thèse sur l'hybridité," p. 21) it was reckoned as a hybrid between *C. distans* and *C. Hornschuchiana*; and more recently M. Grenier in his "Flore de la Chaine Jurassique," while denying the possibility of its being a hybrid derived from *C. Hornschuchiana*, on account of its frequent occurrence in localities from which the supposed parent is entirely absent (an argument which applies with equal force in the case of the Hertfordshire plant), has reduced it to *C. flava* as a merely sterile variety, and has stated that on one occasion he found on the same spikelet every intermediate form of perigynium between the ordinary *flava* and that of the present plant. Should this prove to be universally the case the opinion of M. Grenier would coincide in a remarkable manner with that of Goodenough. M. Duval, who claims to have observed the sterile forms of *C. Œderi*, *flava*, *distans*, and *Hornschuchiana*, attributed their occurrence to the effects of the late frosts of spring (Gren. l. c., pt. 2, p. 857). The explanation seems at present hardly sufficient to account for the evident differences between *C. xanthocarpa* and any form of *flava*. And against it we have the positive testimony of Degland himself, who has mentioned the fruit, and of Boreau, who asserts that his plant remains constant under cultivation. The evidence of Boott, who certainly included *C. xanthocarpa* under his typical *fulva*, and who has described and figured a fertile as well as sterile form, may be taken as lending additional weight in the same direction. It seems more probable that both species have sterile forms. I have not found fully-developed fruit in our Hertfordshire examples, but the perigynia, which in this respect agree precisely with those of M. Schultz's specimens, are considerably smaller and less inflated than those of *C. Hornschuchiana* (with mature fruit), and in this respect differ widely from those of M. Grenier's sterile plant, which are said to be "du double plus gros, plus enflés, et pour cela plus divergents" (Grenier, l. c.). It is questionable pehaps whether the slender "spindle" shape of the male spikelet, on which some stress is laid by Babington in his description of *C. fulva*, may not sometimes be owing to a parallel affection of the masculine element.

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* The difference of *shape* in the glumes is well shown in Reichenbach's figures (Ic. v. 8, No. 620, 621).

† The beak is more slender than that represented in E. B., 1295.

‡ Hoppe, however, considers that *C.* "*fulva*" and *flava* scarcely resemble each other except in the very long bracts which extend beyond the stalk. He may have had only the typical *flava* in view.

§ Schultz (Flora, 1854, p. 471) mentions that all his English specimens of *C. fulva* belonged to *Hornschuchiana*.

‖ Dr. Boswell considers his *C. fulva*, var. *sterilis*, "a very remarkable plant, of which" he "had seen no British specimens," to be a hybrid between *C. fulva* (*Hornschuchiana*) and *flava*. He refers to it the *C. fulva* of Koch = *C. xanthocarpa*, Degl.

C. distans, L.

Not uncommon on the wet moorish ground at the foot of the chalk hills in the north of the county, extending from Ashwell on the borders of Cambridgeshire to Wilstone on the very verge of Bucks. It occurs in several localities about Hitchin, and accompanies *Œnanthe Lachenalii* and *Samolus Valerandi*, both plants of a semi-maritime character, in each of their recorded stations. The correctness of the name has been questioned, as in the case of other inland counties, but the continental distribution is not against its occurrence in such situations, and it has been confirmed by high authorities. After the examination of a considerable number of specimens I can see no reason to doubt the accuracy of their conclusion. The *Carex* in the Kew herbarium from the neighbourhood of Barton, Bedfordshire (see p. 26), distributed as *C. fulva*, var. *speirostachya*, and which was collected at Shardeloes by Mr. Isaac Brown, must be referred also to the present species.

C. binervis, Sm.

The true plant! but quite confined to the south of the county, where in shaded places it attains very large dimensions.

C. lævigata, Sm.

This is given for Hertfordshire in the appendix to the "Flora of Middlesex," but I have never been able to trace on what authority. I need not add that I should be very pleased to be able to include it in our list.

DESCRIPTION OF A NEW SPECIES OF *BACTRIS* IN THE HERBARIUM OF THE BRITISH MUSEUM.

By James W. H. Trail, M.A., M.B., F.L.S.

Bactris Aubletiana, *sp. nov.*—Inermis (nisi spatha interiore aculeata), *B. simplicifrondis*, Mart., habitu; spadix trifidus vel quadrifidus. Caudice pennæ cygneæ crassitie, apicem versus vaginis obvelato;

vagina ·08^{m}-·12^{m} tomento detergibili obsita ad ochream in fibras fissa; petiolo ·07^{m}-·1^{m}, subtereti, supra sulcato; lamina ultra medium bifurca; alis rhomboideo-lanceolatis ·22^{m}-·3^{m} × ·05^{m}-·08^{m}, supra subtusque glabris sed supra venulis transverse striata; venis utrinque 6-8, ·009^{m}-·012^{m} dissitis; spatha exteriore membranacea; spatha interiore ·08^{m}-·1^{m}, fusiformi, longe acuminata, sublignea, setis ·003^{m}-·004^{m} subnigris patulis horrida; spadice ·06^{m}-·08^{m}, pedunculo decurvo, apicem versus sparse setoso, in ramos 3-4, ·04^{m}-·05^{m} fisso; fl. ♀, calyce et corolla subæquilongis, coriaceis, andrœceo sterili nullo; drupa?

Hab.—In Guiana collexit Aublet (Herb. Aublet,) et Martin (Herb. Rudge). Specimina sicca in Musco Britannico vidi.

This species differs from *B. simplicifrons*, Mart., in inner spathe and spadix, and in the very distinct striation formed by the transverse veins on the upper surface of the leaf; in other points they are very like each other. The characters seem constant, as the specimens collected by Aublet and by Martin agree in every respect.

SHORT NOTES.

Lycopodium inundatum in Kerry.—This autumn I found a new locality for this Club-moss, so very rare in Ireland. It grows in some quantity on the shore of Lough Guitane, near Killarney, accompanied by another interesting plant, *Cicendia filiformis*. This is the third Irish county, the previously known localities being in Connemara, Galway, and in Cork.—A. G. More.

Flora of Inish-Bofin, Galway.—This remote island lies in the Atlantic, off the junction of the two counties of Galway and Mayo, about six miles from the nearest point of the mainland of Connemara. It is about three and a half miles long and two wide at its greatest breadth, containing an area of 2312 acres (nearly 4 square miles). The population is 663. The geological formation belongs to the Lower Silurian Schists, with one narrow band of Serpentine on the south-west, and a few trap-dykes. The coast is almost everywhere bounded by rocky cliffs, with the exception of a small piece of low sand at the east end of the island. No trees occur; some Alders and Willows have been planted here and there, but the few stunted bushes of Blackthorn and Aspen, with several Brambles, represent the entire arboreal vegetation. Mr. A. G. More, in August, 1875, paid a visit (in company with Mr. R. M. Barrington) of four days to the island, and one other day was devoted to the adjoining island, Inish-Shark. He has now published, in the "Proceedings of the Royal Irish Academy" (2nd series, vol. ii., Science) a report on the Flora. A complete list with localities is given, amounting to 303 species, or with those seen on Inish-Turk, another of the same group, five miles north of Bofin, 323. The most remarkable plant observed was a variety of *Campanula rotundifolia*, with corollas at least an inch long, named var. *speciosa*. Many species present a stunted and dwarf habit of growth. The rarest plants gathered were: *Helianthemum guttatum*, *Calamagrostis*

Epigeios, *Elatine hexandra*, *Eriocaulon septangulare*, *Sparganium affine*, and *Isoetes echinospora*; and sixteen additions to District VIII. of the "Cybele Hibernica" were made. Mr. More's principal object was to compare the vegetation of this island with that of Aran, of which Mr. H. C. Hart recently published a tolerably complete catalogue.* The Aran group are Limestone, and the flora typically a Limestone one. In the present paper the plants found in one only of the two islands are shown in parallel columns, with the result of giving 161 species peculiar to Aran, and 92 to Bofin, or, deducting naturalised plants, about 120 for Aran and 80 for Bofin. Aran shows in a remarkable degree both the predominance of lime-loving plants and also the greater variety of species which is usually observed on calcareous soils; Bofin exhibits as clearly a series of plants prefering schistose, granitic, or siliceous soils, the only two lime-loving species observed there being *Sinapis alba* (an introduced weed) and *Asplenium Ruta-muraria* (on a ruined wall). No doubt the plants now apparently peculiar will be on further exploration considerably reduced, and the 221 species common to both groups will be probably raised to nearly 300, leaving about fifty plants peculiar to the Bofin group and about 100 to the Aran Isles. As the author remarks, "This is indeed a very striking difference between the flora of two groups of islands situated under the same conditions of climate, and separated by a distance of only thirty-five miles, and shows very plainly how much vegetation is influenced by the nature of the subsoil."

Extracts and Abstracts.

BACTERIA OF THE DANISH COASTS.

Om nogle ved Danmarks Kyster levende Bakterier. By Dr. EUG. WARMING. ("Vidensk. Med. Nat. Forening Kjöben.," 1875; with a French summary).—All along the Danish coast there is found, during calm weather in the summer months, a red colouration of the water close to the shore. The cause of this singular phenomenon is referred to Bacterioid masses which cling to *Zostera* and sea-weeds, and, as might be expected, lose their hold when a storm or a high tide supervenes, and do not regain their position and appear in sufficient quantity to colour the water until calm has been restored. The wet weather of autumn also breaks up the masses, but during the whole winter it is possible to find plants covered with *Bacteria* capable of ready revival, even if their habitat be frozen over. Professor Warming has made a study of this subject with his usual care and success, the results of which—the discovery of several new specific and varietal forms, and the broaching of theories as to structure, reproduction, and classification—we shall notice in a brief manner.

Sometimes floating masses composed of *Clathrocystis roseo-persicina* occur, but most Bacterioid life is found below the surface; here, when decomposition has only slightly advanced, one sees principally small individuals of *Monas vinosa*, but at further stages many other red-coloured forms as well as various colourless ones are developed. A common species is—

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* Noticed in Journ. Bot., 1875, p. 111.

Monas Okenii, of which the Danish examples are not so deeply coloured as are those figured by Cohn; marine specimens are oval or cylindric and straight, fresh-water ones somewhat spiral in form; smaller individuals have a single posterior cilium, the larger one at each end. As to division, Prof. Warming believes that only the small ones exhibit it; occasionally very long cells were found, but they were not constricted in the middle, and showed no sign of division. This does not appear to exhibit a "zooglea" state.

Spirillum violaceum, Warm. — Found in brackish water, is very near *Monas Okenii*, but the spiral is more pronounced, the endochrome is of a dull violet colour, the granules are finer than those of *M. Okenii*, and but few sulphur-grains are present; the extremities bear a cilium, and the movements are more vivacious than those of *M. Okenii*.

Forms referred to *Ophidomonas sanguinea* show scarcely more than three spiral turns; sometimes only one cilium is seen, in other cases there is a cilium at each end, and occasionally two or three cilia, not always occupying a median position, are found at one of the extremities.

Under the name *Bacterium sulfuratum* are united a number of forms, which together make up the chief part of the red colouration. The states in which this appear are:—1. As spheres (*Monas vinosa*, Ehrbg.). 2. As roundish bodies, usually with a constriction and with granules grouped at the ends (*Monas Warmingii*, Cohn). 3. Like *Monas vinosa*, but crowded with sulphur-grains (*Monas erubescens*, Ehrbg.). 4. Long, narrow, cylindrical, and filled with sulphur-grains (*Rhabdomonas rosea*, Cohn). Finally, the series is brought to a close by a spiral form, the amount of torsion varying from scarcely anything to more than one complete turn. Prof. Warming is at a loss to know what becomes of the large forms; he thinks it possible that they form a sort of spore like *Ascococcus*, or become still more enlarged, cast off their cilia, form transverse partitions, and become *Beggiatoa*.

Monas gracilis, Warm., grows only in fresh water; it is straight and rounded at the ends, and its plasma is a little paler than that of *M. Okenii*.

Spirillum Rosenbergii, Warm.—This is a very quick-moving species, of a dull colour, and with a sharply-pronounced spire; it is almost always filled with sulphur-grains which are devoid of the reddish colour found in its allies; also no cilium was observed on it.

All along the Danish coast-line grows *Merismopedia littoralis*, of which families were found consisting of from one to sixty-four tetrads of cells.

Several species of *Beggiatoa* are found in immense quantity on quite flat shores and in the canals of Copenhagen. To a new form is given the name *B. minima*; it is very small, agile, and flexible, with fine articulations, grayish in colour, without sulphur-grains, and with vermiform movements. Associated with *B. mirabilis*, Cohn, was a smaller eciliate condition, without septa, and with great capacity for division; this is looked upon as being the young state of *B. mirabilis*, and the term "germs of *Beggiatoa*" is applied to simple spherical bodies, found with the two last, whose origin is at present uncertain, but which may be derived, it is thought, from spores formed in the full-grown *Beggiatoa*. With the small form Prof. Warming compares *Monas gliscens*, Ehrbg. (*Volvox globulus*, O. F. Müll.), which he thinks may perhaps be the germ of another species of this genus.

Monas Mülleri, Warm. (*Volvox punctum*, O. F. Müll.), is spherical or oval, rarely uniformly filled with sulphur-grains, the latter being usually collected together at one end, while the other end has a hyaline appearance, and it is through these two ends that the septum passes in division. Motion is very rapid, but sometimes individuals in the act of division move with great irregularity; cilia were not seen, but sometimes small particles appeared to travel round the cells, a fact which seems to indicate the presence of cilia.

Like the last, but smaller than it, is *Monas fallax*, Warm.; the border is often hyaline, and the outline irregular; further, in the resting state this species is scarcely distinguishable from an inorganic crystal.

A ribbon-like Schizophyte, with rarely more than 1½ spiral turn, but much elongated (6-9 times longer than broad), is termed *Spiromonas Cohnii*. Its outer wall is thick, and sometimes longitudinal striæ are observed on it, which go off at the end in the form of slender prolongations; division takes place very suddenly in this species.

Spirochæte gigantea, Warm., has a cylindric, truncate, grayish-coloured, apparently eciliate body, finely granular plasma without trace of sulphur-grains, and a varying number of spiral turns, which may reach to 16. In one locality divided individuals were met with, thus affording indications of articulation. Indeed, Prof. Warming thinks it probable that all species of *Spirillum* and all elongated *Bacteria* have invisible articulations.

The "acicular phase" of *Bacterium termo* is distinguished by the name *B. fusiforme*, and a much finer needle-shaped phase is adverted to, but not named.

Prof. Warming did not succeed in directly making out the cell-membrane; in the true *Bacteria* he has never seen the plasma shrink from the cell-membrane by the action of reagents, neither has he observed any internal molecular or granular movement. Sometimes, however, vacuoles are formed round the periphery, and then the membrane is shown very distinctly.

The grains of the plasma are of two kinds:—1. Strongly refringent, without a well-defined bounding circle; these are merely compacted masses of the plasma. 2. The ordinary sulphur-grains resemble oil-drops, and are surrounded by a dark circle.

With regard to classification, Lankester's views as to generic combination are regarded with favour; and it is thought that *Ophidomonas*, *Spirillum*, and *Vibrio* must be at once united; also that certain forms, as *Monas vinosa* and *M. Okenii*, were better placed with true *Bacteria*.

The only form of multiplication observed was by division. Moreover, the "zooglea" state was never seen in salt-water infusions.

STRUCTURE OF THE GROWING-POINT OF THE ANGIOSPERMOUS ROOT.

Ueber den vegetationspunkt der Angiospermen-Wurzeln, insbesondere die Haubenbildung, von H. G. HOLLE. ("Botanische Zeitung," April, 1876.)—The growing-point of most vascular plants shows, besides sharp differentiation of Dermatogen, Periblem, and Plerom, further segmentation of these into single rows and layers of cells, which are constantly being formed, during the growth of the root-point, by tangential division of the upper cells of the primitive Meristem. Moreover, in all elevated groups of vascular plants the root-point, owing to the different arrangements of single rows or masses of its cells, presents different *types* of structure. Naegeli and Leitgeb compared the Angiospermous root-point with that of Ferns and Horsetails, but their work is disfigured through the want to discover a terminal cell in the former. The investigations of Hanstein and Reinke resulted in the establishment of a structure-type founded on the root-point of *Helianthus*, and these authors thought that this type would be the general one for Monocotyledons as well as for Dicotyledons. In this, however, they were mistaken, for Strassburger found that the Amentaceous root furnished an exception; and Prantl discovered an abnormal type in *Pisum* and *Vicia*, which Janczewski regarded as forming a type of equal value to the *Helianthus* one, and, moreover, showed that it is met with also in *Cucurbita*. In the root-cap of the last-mentioned genera we do not find ordinary Plerom, Periblem, and Dermatogen, but a transverse primitive Meristem extends into the middle of the root-cap, which it regenerates, and also builds up the body of the root, the side portion of the cap consisting of Dermatogen, as in the *Helianthus* type. With regard to Monocotyledons, an actual Dermatogen was found by Janczewski only in *Pistia* and *Hydrocharis*; in all other cases the Dermatogen is reduced to the single outermost layer of the rind; this, then, is one of the characters of the ordinary monocotyledonous type, while *Pistia* and *Hydrocharis* have been made into a special type by Janczewski. Finally, monocotyledonous roots are distinguished from dicotyledonous by the fact that in the former the root-cap is formed from a special group of cells (Calyptrogen), while in the latter the Dermatogen takes on this function.

On the subject of types the author holds an intermediate position between Reinke and Janczewski; he cannot agree with the former that all Angiospermous roots come under one structural category, neither does he consent to the establishment of several independent categories. For Dicotyledons he admits a single very widely diffused type—the *Helianthus* type, to which all irregularities are to be regarded as exceptions.

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The dicotyledonous root-cap consists of successively cast-off rows of radially-arranged cells, each of the rows answering to a Dermatogen-cell. In most cases these rows become unrecognisable in the further part of the cap, through irregular development of the cells, but they are often well seen in the roots of embryos, and sometimes—*e.g.*, in *Rumex* and *Epilobium*—in the mature plant. The neighbouring Periblem differentiates, most generally, in the centripetal sense; this is not therefore an exceptional character, as Janczewski supposed.

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An abnormal structure met with in *Leguminosæ* and *Cucurbitaceæ*, and established by Janczewski as a fourth type, is regarded by the present author simply as an exhibition of degeneration. Here the tip of the radicle of the embryo before germination is normal, but directly sprouting commences, the line of division between Periblem and Dermatogen, and between Dermatogen and root-cap is effaced. Owing to longitudinal growth of the central cells of the cap, a more or less evident median columnar portion (säule) is found; and this is sometimes seen even before sprouting of the radicle. Contemporaneously with the loss by these cells of their plasmatic contents, the formative Dermatogen and Periblem-cells cease to divide radially, and so to produce cells for formation of the body of the root. In many instances the formative cells cease dividing tangentially and producing the cap. Still, under these circumstances, the vegetative point can long retain its normal appearance, *e.g.*, in *Rumex*, *Epilobium*, and *Helianthus*. The power of tangential division remains with the top cells of the Periblem, but they develope, not layers which continue the regular Periblem-curves, but longitudinal rows of cells which join the rows of the central column and take on their character.

A remarkable exception to the dicotyledonous type consists in the Periblem taking a share in the construction of the cap: this is found in the genus *Acacia*. In the radicle of the embryo of *A. galiophylla* the Dermatogen shows no tangential division of its cells; moreover, it entirely covers the cap, which arises here, as in Gymnospermous roots, from the Periblem. Further, on the occurrence of germination, a column (säule) is formed in the centre of the cap as in the type. In *A. lophantha* the cap is very large, and the Dermatogen sometimes divides tangentially, by which means the outer layer takes on the character of epidermis, and in this case, too, a "säule" is formed. The root-tip of *Juglans* comports itself in a similar way, but here the greater part of the cap is derived from the Dermatogen, and only a small part from the Periblem.

Among Monocotyledons the independent cap-forming "Calyptrogen" is so widely diffused as to justify Janczewski's erection of the ordinary root of this class into a special type, but the author does not think that Janczewski should be followed in basing a second monocotyledonous type on *Hydrocharis* and *Pistia*. The Dermatogen is here laid down through the first tangential division of the formative cells, and henceforward it follows its special law of development, appearing either single or divided in the form of a many-layered (two-layered in *Iris*) epidermis. In only a few cases is the Dermatogen to be distinguished from the first of the Periblem-curves when the latter are developed in the centripetal sense; but where a many-layered centrifugally developed epidermis is found, the first-differentiated Dermatogen can be sharply distinguished from the outer-formed layers of Periblem. In many cases the outer part of the epidermis passes gradually into the inner, but sometimes this gradual transition is interrupted by the development of the latter centrifugally, and of the former centripetally.

As in Dicotyledons, a "säule" is usually found here, but it appears later than in Dicotyledons, and sometimes is not to be seen. In the case of *Cordyline vivipara* the top of the body of the root participates in its formation.

Ueber den Vegetationspunkt der Dikotylen-Wurzeln. Von JACOB ERIKSSON. ("Botanische Zeitung," October 13th, 1876.)—The views of this author diverge from those of Holle above noticed, and are nearer those of Janczewski. He admits four types of structure of the dicotyledonous root, viz. :—

1. The root-end has three separate Meristem-tissues, of which the Plerom gives origin to pericambium, fibro-vascular bundles, and pith ; the Periblem acts as the Meristem of the primary bark-layers, and the Dermatogen or Dermatokalyptrogen produces the epidermis and root-tip (Haube). The Periblem of this type arises either from a single cell-row (Initialenreihe), or from two or from three or more cell-rows.
2. Two Meristem-tissues are present in the root-end ; a Plerom and a single tissue for the production of primary bark-layers, epidermis, and root-tip.
3. Only a single Meristem-tissue is found.
4. This shows Plerom and Periblem, but the latter is external, and builds up the root-tip from without inwards.

Numerous instances of the occurrence of each type are given, and a fuller treatment is promised at some future time.

AROIDEOUS MORPHOLOGY.

Zur Morphologie der Araceæ. Von DR. A. ENGLER. ("Botanische Zeitung," February, 1876.)—The following are the chief results arrived at :—

Method of Branching.—*Pothos*, *Pothoideum*, *Heteropsis*, and some species of *Philodendron* branch monopodially, while in all other cases a sympode is formed.

Phyllotaxy.—In a few genera the leaves are distichous, but as a general rule they are pentastichous. In *Pistia* almost a $\frac{2}{5}$ arrangement is found, and on the vegetating shoots of a few species of *Anthurium* the leaves are pentastichous, while they are distichous on the flowering shoots.

Nature and Position of Leaves, &c.—The inferior leaves (Niederblatter) of the side-shoots usually diverge in the $\frac{1}{2}$ sense from the leaf in whose axil the shoot is borne. Sometimes, with distichous examples, the second of the inferior leaves of a shoot diverges from the first to a greater extent than $\frac{1}{2}$, whilst the $\frac{1}{2}$ divergence of the third leaf is discontinued ; the fraction $\frac{3}{4}$ almost represents this state of things in *Anthurium*, and a still higher formula is required for *Calla* and *Rhaphidophora decursiva*. The spathe—absent only from the highest flowering-bearing branches of *Pothoidium*—is always placed in accordance with the phyllotaxical system which prevails on the branch bearing it. When side-shoots are developed from a flowering-branch, they also produce flowers, and show, besides their basal leaf (Grundblatt), only the same kind of leaves as the shoot whence they are derived produces above the leaf from whose axil the branching takes place ; so that when the flowering-shoot stands in the axil of a foliage leaf, the young branch borne by it developes, besides its basal leaf, foliage leaves and a spathe ; but if the former arises from the axil of an inferior leaf, the latter shows only inferior leaves and a spathe. As a rule, the new shoot stands in the axil of the penultimate leaf below the spathe; in *Acorus* and *Orontium*, however, it arises from the ultimate leaf.

Sometimes inferior leaves (niederblatter) alternate with foliage leaves—*e g.*, when a new shoot is a continuation of the axis of the primary one, if the latter bore foliage leaves immediately below the spadix, the former produces first a number of inferior leaves followed by foliage leaves (*Arum*, *Arisæma*, *Caladium marmoratum*); but if the primary shoot bore inferior leaves below the spadix, the secondary one shows first foliage leaves and then inferior leaves (*Sauromatium*, *Biarum*, *Remusatia*, &c.).

Comparison of the ramification of other Monocotyledons with Aroids shows that this family is singular in the frequent renewal of foliar development on the flowering-branches, which, outside the Order, is found only in *Eichornea azurea;* but some similarity is also presented by *Zostera* and *Cymadocea*.

Classification.—The Order is divided into three main groups:—

1. *Pothoideæ.*—Without any prominent peculiarity of their cellular tissue and fibro-vascular bundles; to this group belong *Acorus*, *Heteropsis*, *Anthurium*, *Lasimorpha*, *Cyrtosperma*, *Lasia*, *Anaphyllum*, *Symplocarpus*, *Pothos*, *Pothoidium*, and *Gymnostachys*.

2. *Monsteroideæ.*—In which the flowers are bisexual and the leaves usually distichous, but the main character is derived from the presence of numerous H-formed sclerenchymatous cells; the group includes *Anepsias*, *Spathiphyllum*, *Rhaphidophora*, *Rhodospatha*, *Atimeta*, *Monstera*, *Tornelia*, *Epipremnum*, *Scindapsus*, *Anodendron*, and *Cuscuaria*.

3. *Aroideæ.*—A motley assemblage, containing forms with perfect and imperfect flowers, but characterised by a more or less perfectly developed laticiferous system in the phlœm of the fibro-vascular bundles, and usually on both sides of the bundles. This system, which rarely contains latex, is present in *Pistia*, but in *Lemneæ* it appears to be wanting.

Further information concerning the morphological relations of *Pistia* and *Lemnaceæ* proper, as well as the modifications of the reproductive parts, must be sought from the paper itself. We shall look with interest for the figures which Dr. Engler promises to publish.

Hairy Embryos.

Sur quelques cas d'embryons velus.—Par. M. Cas. De Candolle. (Bull. Bot. Soc. de France, 1875, p. 229.)—Out of thirty-seven species of *Meliaceæ* examined by M. De Candolle, seven were found to have hairs on some part of the embryo. *Epicharis rosea* has a thick mass of notched hairs extending over the plumule, hypocotyledonary axis, and radicle of its embryo; in the case of *E. Lessertiana* the hairs are of two kinds, two rows of long unicellular colourless ones run down the back of the primordial leaves as far as the cotyledons, and the gemmule is covered with glandular ones; a few colourless hairs surround the base of the gemmule in *E. polypoda*, while in several American species of *Trichilia* the hairyness is restricted to the hypocotyledonary axis; lastly, *Aglaia elæagnoides* from Australia has an embryo abundantly covered with scaly hairs similar to those on the bark and leaves. To this list of M. De Candolle may be added *Aglaia Roxburghiana*, which Mr. Hiern has described as having a pilose radicle, and the well-known instance in a member of another family, *Connaraceæ*—we allude to *Byrsocarpus*.

Proceedings of Societies.

Linnean Society.—*Nov.* 2, 1876.—G. J. Allman, F.R.S., President, in the chair.—Mr. I. B. Balfour and Rev. R. Clarke were received as Fellows of the Society. A specimen of *Tordylium maximum*, collected on August 30, near Tilbury Fort, Essex, by Mr. E. de Crespigny, was exhibited. It grew plentifully on the sides of a ditch near the railway station. The following botanical papers were read:—"On the Classification and Terminology of Monocotyledons," by G. Bentham. Lindley, in his "Vegetable Kingdom," proposed the separation of a distinct class, *Dictyogens*, for certain genera with reticulate venation; a division generally rejected. E. Fries (1835) taking the perianth established four primary divisions partially corresponding to those here adopted. Brongniart (1843) relied on the nature of the albumen for a rearrangement of the Dicotyledons and Monocotyledons; from this, however, serious exceptions detract. Other characters have been considered important by different botanists, but none strictly followed out in detail. The subjoined classification is that now recommended as combining practical convenience along with supposed natural affinities. In consequence, however, of the necessity for a linear series (not in nature) some of the Orders have got separated from near connections.

I. EPIGYNÆ.

Hydrocharideæ.

Scitamineæ (Musaceæ, &c.).

Orchideæ.
Burmanniaceæ.

Irideæ
Amaryllideæ (Hæmodoreæ, &c.).
Taccaceæ.

Dioscorideæ.

Bromeliaceæ.

II. CORONARIEÆ.

Roxburghiaceæ.
Liliaceæ (Smilaceæ, Melanthaceæ, &c.).

Pontederiaceæ.

Philhydraceæ.
Xyrideæ.
Commelynaceæ.

Juncaceæ.
Palmæ.

III. NUDIFLORÆ.

Pandaneæ.
Aroideæ.
Typhaceæ.
Lemnaceæ.
Naiadeæ (Juncagineæ).

Alismaceæ.

IV. GLUMALES.

Eriocauloneæ.
Centrolepideæ.
Restiaceæ
Cyperaceæ.
Gramineæ.

A salient objection to the above may be the wide remove between the *Hydrocharideæ* and *Alismaceæ*, which have resemblances in aquatic habit, embryo, perianth, and stamens. The *Scitamineæ* take the above place rather, because elsewhere they would break through more natural series than that they are closely affined to *Hydrocharideæ*. *Orchideæ* are somewhat circumscribed, the approach to *Scitamineæ* being in irregularity of flower, and to *Burmanniaceæ* in minute exalbuminous seeds and homogeneous embryo. The latter order is connected with the *Orchideæ* by ovary and seeds, to *Irideæ* by centrifugal inflorescence. The *Irideæ* commence a long series of orders extending to and including *Cyperaceæ*, the boundary lines being indefinite, and cross-relationships existing. The former are distinguished by equitant leaves, centrifugal inflorescence, regular or oblique triandrous flowers with anther-cells turned outwards, though none of these characters are constant. The division *Coronarieæ* is taken in Endlicher's extended sense. As to the *Liliaceæ*, the author in the main accepts Mr. Baker's revision of that order. *Pontederiaceæ* differs but little from the Lily group. *Philhydraceæ*, comprising three genera, in ovary, &c. may be referred to *Xyrideæ*, but in ovule and basal embryo is linked to *Liliaceæ;* flowers, stamens, and staminodia are those of *Scitamineæ*. The *Juncaceæ* are doubtless connected with the *Liliaceæ*. Palms are universally recognised as a substantive order, some even would raise them to a separate class, yet their woody stem and peculiarities of leaf are the main characters; flower and fruit being very like those of *Juncaceæ*. The *Nudifloræ* proper, with five orders, are by all acknowledged as closely affined, though variable in certain structures. The *Alismaceæ* are regarded as an anomalous order connecting in some measure the *Naiadeæ* with *Hydrocharideæ*. The *Glumales* are a group now very generally admitted, although with different limits, according to the notion attached to the term glume. On this point the author holds that the organs enclosing the essential parts of the flowers of Glumales are all either perianth-segments, or more frequently bracts or bracteoles performing the functions of very much reduced or absent perianths. And there would be no absolute error in the uniform employment of these three terms whenever the distinction between them is clear, and of the more general terms scales or setæ when doubtful. But as the biological functions of bracts or bracteoles increase in importance, so also does their character acquire fixity, and convenience arises in the introduction of the term glume for the primary bracts of the spikelet, and of special ones—perigynium, palea, lodicule, &c.—for modifications of the secondary scales in particular groups. It is, however, very essential for a correct understanding of the floral structure that whenever possible a definite meaning should be given to each term used. The term glume has been too widely employed—*e.g.*, for the perianth-segments of *Restiaceæ*. Mr. Bentham follows out this subject by comparisons of the structures extant in a great number of genera, first insisting on two great laws in terminology:—1. Homologous and generally similar organs should be designated by the same name. 2. Where the want of homology of two organs has been demonstrated they should be called by different names. An exception to the first would be—where in a series of homologous organs a certain number of them are regularly modified in consequence of a difference in the functions they are called upon to perform, when it may be convenient to describe them under a different name. With regard to Grasses, the author maintains the terminology first adopted by him in the "Handbook of the British Flora," the "lower palea" of most descriptive botanists being regarded as a glume; he sums up—that the spikelets of *Gramineæ* may be described as composed of a series of alternate glumes, distichously imbricated along the axis; one, two, or rarely more at the base of the spikelets, and sometimes a few at the end empty, the others having each a sessile flower in their axil; the short floral axis bearing a palea, two or rarely three lodicules, and three rarely two or six stamens under the terminal ovary. ——"Supplemental and Concluding Notice of Marine Algæ, collected by Mr. Moseley, of the *Challenger* Expedition." By Professor Dickie. These had been obtained from various localities during the voyage. One species of *Corallinaceæ*, *Lithothamnion imbricatum*, is new, but all the other specimens, some fifty in number, are already known, their interest lying in their geographical distribution. ——Dr. R. C. A. Prior called the attention of the Fellows to some specimens of *Dahlia*. These possessed no special structural peculiarities; but, with respect to their colour, he had been surprised to find that some thirty-four individuals having been asked their opinion, gave thirteen different names or shades of colour to the flowers in question. Hence arises the interrogation, is appreciation of colour interfered with in a majority of cases by the occurrence of colour-blindness? Or, again, so far as plants are concerned, are the so-called differentiation of tints but haphazard guesses, distinctive lines of demarcation or agreement as to names for definite shades being not yet arrived at?

Botanical News.

ARTICLES IN JOURNALS.—OCTOBER.

Scottish Naturalist.—F. Buchanan White, "Botanical excursion to Loch Clunie, Perthshire."

Œsterr. Bot. Zeitschr.—L. Celakovsky, "Botanical notes" (contd., *Silene candicans*, n.s.).—A. Kerner, "Distribution of Hungarian plants" (contd.).—S. Schulzer v. Muggenberg, "Mycological notes" (contd.).—M. Stossich, "Excursion in littoral Croatia."——F. Antoine, "Botany at the Vienna Exhibition" (contd.).

Bot. Zeitung.—Schenk, "On the receptacle in fossil Equisetaceæ? *Sphenophyllum.*"—J. Eriksson, "On the growing point of Dicotyledonous roots" (contd.).—O. Behrendsen, "On the Flora of the north-east Zemplin districts."

Flora.—J. Müller, "Rubiaceæ Brasilienses novæ."—C. Kraus, "Mechanism of the direction of growth of young rootlets."—A. de Krempelhuber, "Lichenes Brasilienses" (contd.).

Hedwigia.—N. Sorokin, "Further on the distribution of *Cronartium ribicola*."—Id., "On some new forms of *Entomophthora*."—Krempelhuber, "Lichenes Mexicani."—Sauter, "New Fungi."

Nuovo Giorn. Bot. Ital. (Oct. 2nd).—R. Pirotta, "Synopsis of Fungi of province of Pavia."—N. Pediciuo, "On study of pollination."

Bot. Tiddskrift (ser. 3, tom. i., pt. 2).—E. Warming, "On a new social *Gonium*."—Id., "Biological and morphological notes."

Journ. Linn. Soc. (23rd Oct.).—Mr. J. Berkeley and M. C. Cooke, "Fungi of Brazil."—F. Darwin, "On the glandular bodies on *Acacia sphærocephala* and *Cecropia peltata*, with appendix on nectar glands of *Pteris aquilina*" (tab. 6).—J. M. Crombie, "Lichens collected by W. Pool in Madagascar."—J. G. Baker, "On collection of Ferns made by W. Pool in interior of Madagascar."

Ann. des Sc. Nat. (ser. 6, t. iii., pt. 3).—E. Prillieux, "On the formation and development of some galls" (contd., tab. 16-18).—J. Decaisne, "On some plants of the group *Theophrasteæ*" (*Deherainia*, gen. nov., t. 12).—S. Sirodot, "On *Balbiania investiens*" (tab. 13-15).—E. Bescherelle, "Bryological Flora of the French Antilles."

Dr. Braithwaite announces the intended issue to subscribers of "Sphagnaceæ Britannicæ exsiccatæ," which will include about fifty forms, illustrating his recent monograph, in the choicest dried specimens, both mounted, and loose for microscopic examination. Three Continental species not found in Britain will also be included. Only fifty copies will be prepared, in imperial quarto size, price 25s., and the author will be glad to have the names of those desiring to possess the work. Address, The Ferns, Clapham Rise, London.

We hear that Mr. I. B. Balfour's Rodriguez gatherings are to be published by the Royal Society, illustrated by thirty plates.

Mr. Baker has a paper on the Fern-Flora of the Seychelles in the "Transactions" of the Royal Irish Academy (vol. xxv., p. 15), illustrated by two plates. A list of the *Myrtaceæ* of the group has also appeared in the "Proceedings" of the same learned body.

We have received from Baron von Mueller careful descriptions, with good figures, of three new genera of fossil fruits from the upper tertiary auriferous drift of New South Wales, in the Report of the Geological Survey of N. S. W. for 1875. *Rhytidocaryon* is referred to *Menispermaceæ*, *Spondylostrobus* to *Cupressineæ*, and *Penteune* is probably either Sapindaceous or Meliaceous.

The last part of Prof. Baillon's "Histoire des Plantes" contains the Families *Castaneaceæ* (*Betuleæ*, *Coryleæ*, *Myriceæ*, &c.); *Combretaceæ* (including *Nyssa* and *Alangium*); and *Rhizophoraceæ*. The same author's "Adansonia" has completed its 11th volume.

White's recently printed Directory for Leicestershire and Rutland contains a revised list of plants. Nothing is added, however, to Coleman's very complete catalogue, besides the additions in "Topographical Botany," and a very few segregates.

The herbarium of the late Baron Oscar de Dieudonné has been presented to the Botanical Gardens of Brussels. It contains 10,537 species, represented by (it is estimated) about 45,000 specimens, and is one of the most complete collections of the plants of Europe ever brought together.

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ERRATA ET CORRIGENDA.

P. 1, l. 15 from bottom, *dele* "and Prof. Babington."
P. 65, l. 6 from bottom, *for* "*Stropharea*" *read Stropharia.*
P. 93, ll. 4 and 7, *for* "Segnes" *read* Seynes; l. 10, *for* "*Stenocarpul*" *read Stenocarpus*; l. 9, *for* "Facire" *read* Faivre.
P. 98, l. 11 from bottom, *for* "Magazine" *read* Menagerie.
P. 122, l. 14 from bottom, *insert* the *before* "author."
P. 159, l. 5 from bottom, *for* Saungar *read* Suringar.
P. 160, *dele* l. 16 from bottom.
P. 161, l. 6, *for* "176, 177" *read* 178, 179.
P. 177, l. 20 from bottom, *for* "*barbadensa*" *read barbadense.*
P. 186, l. 14, *for* "CERNUA" *read* CERNUUS.
P. 191, l. 18, *for* "*vericulosa*" *read vesiculosa.*
P. 208, l. 14, *dele* the comma after "*Olinearum.*"
P. 235, l. 16 from bottom, *for* "126" *read* 196.
P. 244, l. 20, *for* "*L*" *read S.*
P. 287, l. 20 from bottom, *for* "hausteria" *read* haustoria.
P. 313, l. 27, *for* "Aaturfor" *read* Naturfor.
P. 317, l. 20, *for* "*Batatus*" *read Batatas.*
P. 320, l. 3 from bottom, *for* "Martins" *read* Martius.

Some additional corrections in Mr. Spruce's paper will be found at p. 235.

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